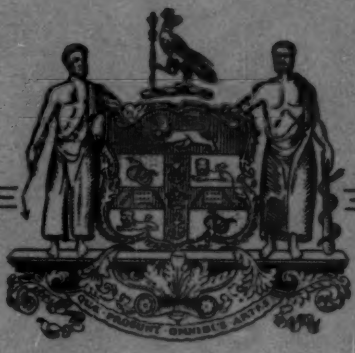

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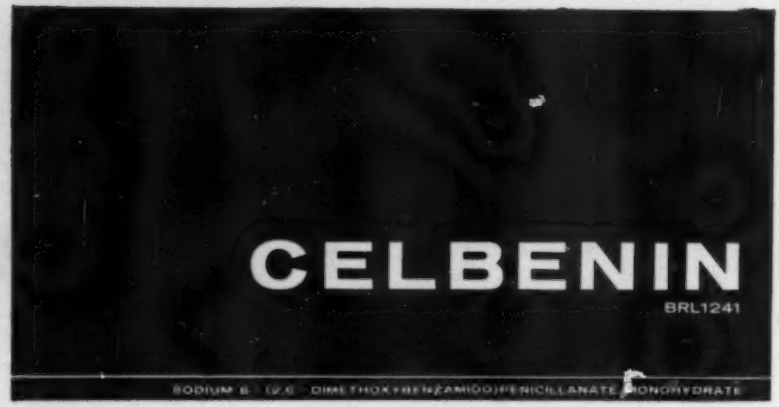

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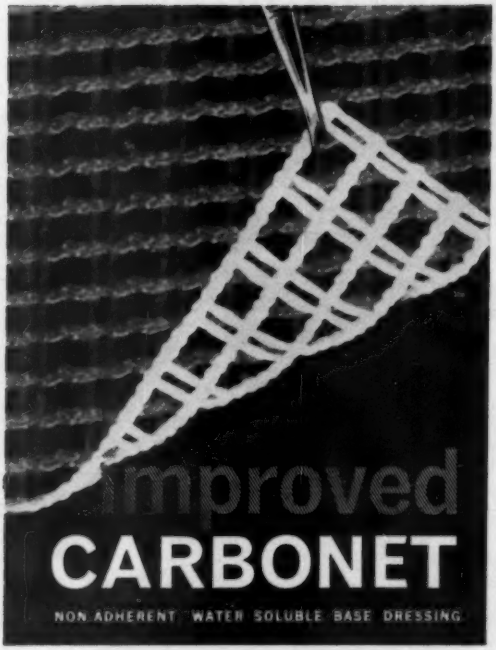

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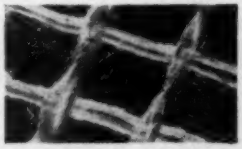

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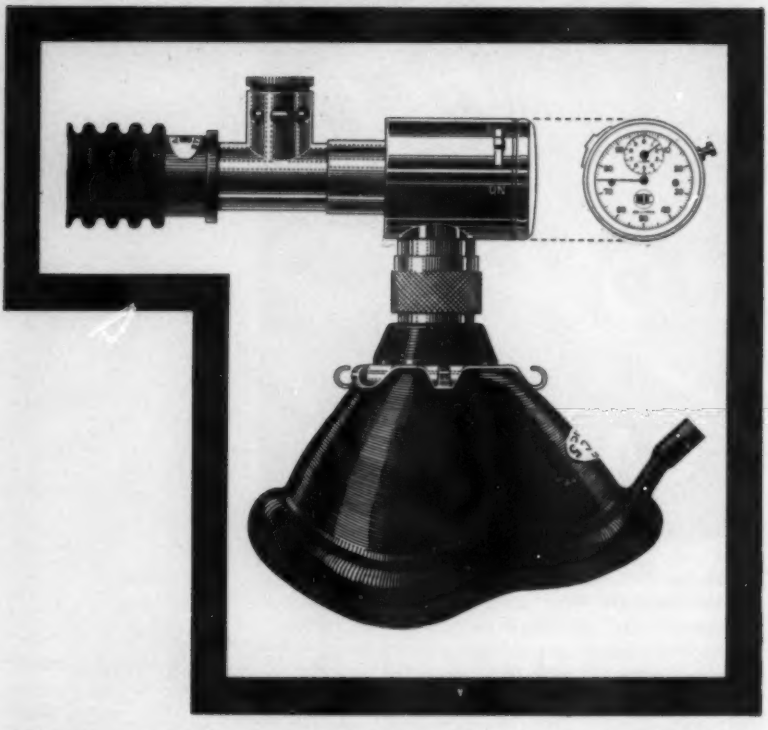

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SURGERY OF THE MANDIBULAR JOINT

Charles Tomes Lecture delivered at the Royal College of Surgeons of England

on

15th July 1960

by

Terence G. Ward, C.B.E., F.D.S.R.C.S.

Dental Surgeon, Queen Victoria Hospital, East Grinstead

IT IS A great honour to read the Charles Tomes Lecture and the subject of my paper is " Surgery of the Mandibular Joint ".

In this country, increasing numbers of patients are referred to dental out-patient clinics with diseases or derangement of the mandibular joint. To diagnose the pathology present and to treat the symptoms require a deep knowledge, not only of the functional anatomy and the physiology of the temporal mandibular part of the joint, but also of the teeth and their supporting structures.

The mandible articulates with the skull, not only with the articulating surface of the condyles in the glenoid fossae, but also by the mandibular teeth occluding with the maxillary teeth. Disturbance in one of the three articulations can produce symptoms in one or both of the other component parts. It is increasing recognition of the mandibular articulation as a three-component joint, one of which is the teeth, that has directed lesions of the temporo-mandibular component of the articulation to the dental surgeon for treatment.

John Hunter states: " There is one disease of the jaws which seems in reality to have no connection with the teeth, but of which the teeth are generally suspected to be the cause. . . . I have known cases of this kind where all the teeth on the affected side of the jaw have been drawn out, and the pain has continued in the jaw; in others it has had a different effect, the sensation of pain has become more diffused and has at last attacked the corresponding side of the tongue."

He goes on to describe several remedies that have failed, but concludes, a little hopefully perhaps, " Sea bathing has been in some cases of singular service ".

This was perhaps the earliest written work on mandibular joint arthrosis, but in 1934 Costen published *A syndrome of Ear, and Sinus symptoms dependent on disturbed function of the Mandibular Joint*, and although Costen's syndrome is generally disproved, there is no doubt his paper brought symptomatology to the attention of clinical investigators and led to a great deal of work and published results on " Mandibular Joint Disturbances ".

At the Queen Victoria Hospital, East Grinstead, post-graduate students from all parts of the world attend the hospital for varying periods of time, and simplicity of teaching is desirable. There are many operative procedures that can be performed on the mandibular joint, but there are three basic operations that can suffice for pathology or derangement where surgery is indicated. The three operations are:

1. Condylectomy.
2. Arthroplasty.
3. Condylotomy.

1. *Condylectomy* is indicated in cases of arthrosis or arthritis when pathological changes can be demonstrated on X-ray in the bony components of the joint; such changes are the classical radiological signs of osteo-arthritis, osteophytic or resorptive bone changes. Condylectomy is also indicated in cases of hypertrophy, osteoma or other tumours of the condyle.

The surgical approach to the mandibular joint should give adequate access without damaging the facial nerve, and the incision is made either above or below the level of the main trunk of the facial nerve, the surface landmark of which is the attachment of the lobe of the ear.

The sub-mandibular incision for a condylar operation would only be used for the exceptional case, such as a very large tumour of the condyle. Normally the incision is in the fold in front of the ear, from the upper aspect of the zygomatic arch to the attachment of the lobe of the ear, and an extension of the incision is carried in the hair line forward to facilitate access without strong retraction. Heavy retraction in close proximity to the facial nerve can produce paresis.

The case I illustrate is of a young girl aged 17, who had noticed a progressive deformity of the face over a period of two years.

On examination there was a definite facial asymmetry with the chin displaced to the right. The maxilla appeared to be normal.

Intra-orally there was a cross bite with a lingual inclination of the molar teeth and on the left side there was a vertical elongation of the maxillary alveolar bone to bring the maxillary teeth into articulation. The jaw movement was normal. X-rays showed an asymmetrically developed jaw with excessive growth in length of the left side, including the mandibular condyle, and a diagnosis was made of left-sided unilateral condylar hyperplasia.

Under endotracheal anaesthesia and controlled hypotension, the line of incision as described is marked in Bonney's blue and the flap raised and held by a stitch.

The condyle is approached from the posterior aspect, taking care not to cut into the cartilage of the external auditory canal, and the capsule of the joint is opened (Fig. 1).

The osteotomy is performed with a chisel and the external pterygoid muscle is removed from the neck of the condyle which is then extracted.

A corrugated rubber drain is inserted into the dead space and brought out behind the ear and the tissues are repaired in layers (Fig. 2).

The post-auricular drain remains *in situ* for 48 hours and enables a complete repair of the visible anterior scar to be made. Intermaxillary fixation is achieved by means of a single pair of eyelet wires, the jaw

Fig. 1. Exposure of the condylar head from the posterior aspect.

being wired to the maxilla in a centric position and immobilization maintained for seven days. Post-operatively there is minimal scar cosmetic deformity and the mandible is in a centric occlusal position and the movement is normal without any training appliance. Later the bite will be rehabilitated by conservative dentistry.

The condylar head was sectioned and compared with a normal condyle of a 17-year-old and the findings were consistent with a simple condylar hyperplasia.

2. *Arthroplasty*. Inability to open the mouth may be due to spasm or fibrosis in the elevator muscles of the mandible, or it may be a sequel to the injection of a sclerosing fluid into the joint cavity. Such cases can be

treated by manipulation and subsequent disciplined exercising; but where there is bony or fibrous ankylosis, surgery must be carried out. Ankylosis is due to a fibrous or bony union of the joint surfaces; it may be unilateral or bilateral and may be caused by birth trauma, suppurative arthritis, rheumatoid arthritis, osteomyelitis or comminuted fractures of the condylar head.

In ankylosis of the mandibular joint in a child, surgical mobilization of the joint should be carried out as soon as possible. The growth centre is

Fig. 2. The repaired incision and the post-auricular drain.

destroyed, but mobilization will encourage nutrition and dental care with a subsequent mitigation of the deformity.

Many operations have been described to mobilize an ankylosed joint. Barton of Philadelphia in 1826 carried out an ostectomy at the neck of the condyle, and Esmarck in 1851 described the removal of a wedge-shaped piece of bone from the ascending ramus of the mandible.

Subsequent to that many operations have been described, the basis of them being the removal of the mass of bone uniting the mandible to the base of the skull, and the interposition of muscle, cartilage dermis or

fascia to prevent osteogenesis recurring. But experience has shown that, even with disciplined exercising of the mandible for a long period after operation, ankylosis tends to recur in a great many of the cases.

More recently the removal of the mass of bone and the interposition of acrylic, vitallium, tantalum foil, or chrome cobalt, have been advocated.

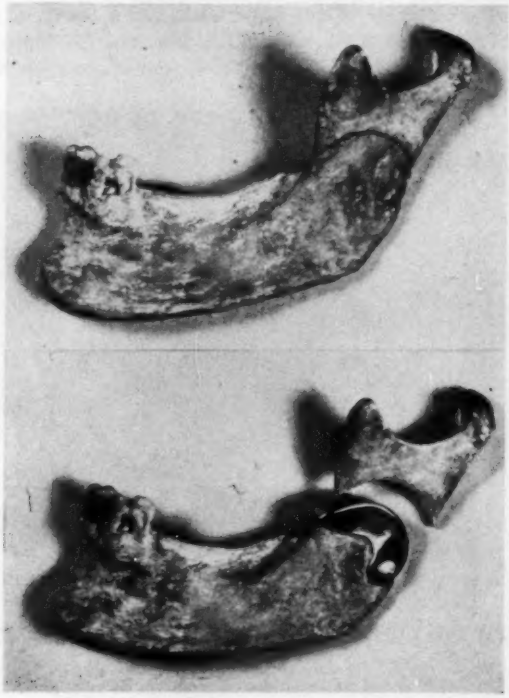

Fig. 3. Cover of chrome cobalt made to cover the upper surface of the lower part of the new joint.

Most of these operations are designed to create a joint in the condylar region and the use of artificial condyles made of vitallium was advocated by Foged nearly 20 years ago (1942). Husted and others carry out a two-stage operation, in which the condylar mass is removed, the jaw mobilized, an impression is taken of the sectioned aspect of the ascending ramus of the mandible and from this impression an acrylic condylar head is processed which is fixed to the mandible at a subsequent operation.

The operation developed at East Grinstead for ankylosis is basically the retention of the condylar mass and the creation of a new joint below it.

True lateral and posterio-anterior X-rays of the facial bones are taken and from these X-rays a model mandible is made in plaster endeavouring to reproduce the shape and dimensions of the ascending ramus to be operated upon.

On this plaster model, just above the level where the inferior dental nerve enters the mandible, a half-circle, convexity upwards, is marked on the bone and the ramus is sectioned along this line. A roof or cover of chrome cobalt is made to cover the upper surface of the lower part. This

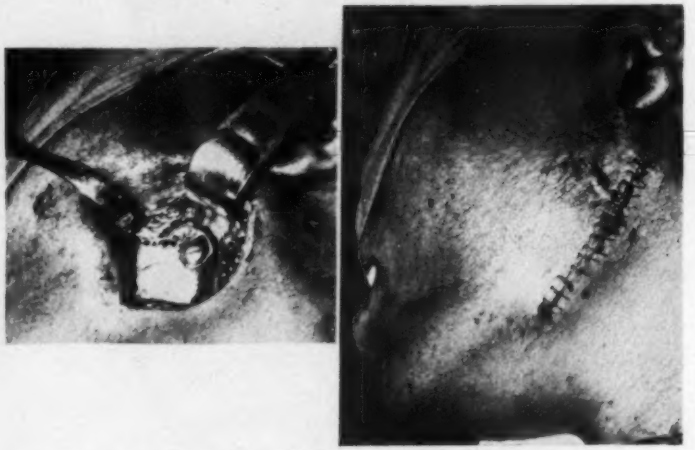

Fig. 4. The implant screwed into position and the tissues repaired.

cover projects inwards beyond the inner surface of the mandible and is fixed by a single screw at the posterior edge of the ascending ramus (Fig. 3).

The case illustrated is of a coloured woman aged 37 years.

Twelve years ago, the lower left wisdom tooth was removed. This was followed by pain and swelling over a period of ten months with subsequent inability to open the mouth. As a result, though a happy woman, she had avoided social contacts. On examination, the lady was not suffering from malnutrition. The jaw opening was minimal, and X-rays showed a mass of bone occupying the condylar region. The chrome cobalt cover was made as shown in the illustration and, under endotracheal anaesthesia with controlled hypotension, a submandibular incision is made inferior to

the facial nerve and posterior to the facial artery. Dissection is carried down to the mandible and the masseter muscle elevated to expose the external surface of the ascending ramus of the jaw. The internal pterygoid muscle is not disturbed. Using a prepared template, the appropriate circle is marked on the ramus at the pre-determined level and, using a dental engine and burs, the osteotomy is performed.

The jaw is then mobilized, any rough edges smoothed down in the line of bone section, and the chrome cobalt implant placed in position (Fig. 4).

If the preliminary work has been carried out precisely, then the implant should fit accurately. It is fixed in position with a single bone screw and

Fig. 5. Post-operative X-rays showing position of the implant and mouth opening.

the tissues are repaired in layers; no dead space is left and no drain is necessary.

Ten days after the operation, although slight swelling is still present, the opening is good and easily accomplished with freedom from pain. The post-operative X-rays show the position of the implant, and the mouth opening is adequate (Fig. 5).

This operation, I think, has many advantages to commend it. The surgical approach is not difficult, as no attempt is made to remove the condylar mass of the bone. The simplicity in design of the chrome cobalt implant enables a surgical technician to fabricate it in cooperation

with the surgeon without difficulty. In the cases done by this method, subsequent limitation of mandibular movement has not recurred and with a cooperative patient there is no need to fix or supply oral exercisers. Several of these operative procedures have been done bilaterally—it leaves the patient with a hinged movement of the mandible only, but function has been good.

3. *Condylotomy*. Joint derangements are extremely common, the patient presents with a history of a click and/or pain in the preauricular

Fig. 6. Path of director in relation to the maxilla and mandible.

region. Hankey in a previous Tomes Lecture in 1954 analysed 150 cases and showed that in the majority of cases the ætiology of the arthrosis was occlusal disharmony and that correction of the occlusal abnormality would eliminate the symptoms in the majority of cases.

It is generally accepted that retroposition of the condylar head is the ætiology of the symptoms and, if untreated, the condylar head will not occupy its normal position in relation to the meniscus, but in protrusive movement will push the meniscus in front of it producing for the patient a feeling of obstruction in the joint.

Occlusal rehabilitation aims to bring the retroposed condylar head more forward to establish the normal relationship between the head of the condyle and the meniscus, and is a successful treatment of the arthrosis in most cases.

Surgical procedures used for joint arthrosis are many. Hydrocortisone injections are useful in the acute joint, especially if effusion is present, but the effect is a transient one, unless the ætiology of the trauma is ascertained and dealt with.

Sclerosing solutions are injected into the joint in an endeavour to produce fibrosis and stabilization. Schultz in 1937 advised the use of an aqueous solution of sodium psylliate for the purpose, but though it has a

Fig. 7. Director being inserted underneath the mandible.

use in hypermobility of the joint, it has never seemed a logical treatment for arthrosis.

Meniscectomy as a treatment of joint derangement was first described by Lanz in 1909, and 30 years later Sir Cecil Wakeley enthusiastically recommended meniscectomy as a surgical cure of joint derangement. Many other authors have advocated this procedure and few have found fault with it. At East Grinstead the problem has been approached in a different way. Oral rehabilitation by means of inlays and crowns is a long and expensive treatment. A prosthesis worn permanently to modify the bite must promote caries and subsequent premature loss of teeth. Could one accept the occlusal imbalance and modify the position of the condylar head?

The " post-fracture syndrome " (Thoma, 1958) has always occupied oral surgical literature as one of the causes of arthrosis.

It states: " Fractures through the neck of the condyle with or without dislocation and fractures of the ramus or mandibular body when not properly reduced can produce traumatic changes in the joint ". In fractures of the mandibular body, the trauma is the occlusal disharmony resulting from an improper reduction. But I have had considerable experience of fractures through the neck of the condyle and I have not seen a case of arthrosis resulting from such a fracture. Also in a few cases of fractured neck of condyle, where a history was obtainable of previous joint derangement, that derangement was cured as a result of the accident. It therefore seemed logical to fracture the neck of the condyle and allow the external pterygoid muscle to pull the condylar head forward.

Fig. 8. Director emerging below the malar and Gigli saw attached.

MacGregor in a previous Tomes Lecture (1955) demonstrated that union of the condylar fracture is always to be expected and therefore, by moving the condyle forward by surgery, a new muscle balance will be created between the external pterygoid on the operated side and the other muscles involved in mastication.

It was decided to use a closed approach for the condylotomy. Ostectomy of the ascending ramus of the mandible is simply carried out by passing a Gigli saw with the aid of a suitable director and sawing through the bone. Using the same approach, if the mouth is opened instead of being closed while the director is being passed, then the director will come through the sigmoid notch and the Gigli saw can be brought into an appropriate cutting position on the neck of the condyle (Fig. 6).

In fact many condylotomies have been carried out in error when the surgical intention has been to saw through the ascending ramus of the mandible below the sigmoid notch.

The case I illustrate is that of a middle-aged woman with a typical history of right-sided mandibular joint arthrosis. She had been treated by a complete repertory of conservative methods without avail, and it was decided to accept her occlusal pattern and alter the position of her right condyle.

Fig. 9. P.A. X-ray showing position of condylar head.

Under endotracheal anaesthesia, and controlled hypotension, but not using a relaxant as it is essential to know that the facial nerve is able to respond if stimulated, a line is drawn across the face. The landmarks used are from a finger's breadth below the attachment of the lobe of the ear to just below the inferior orbital margin. This line is used as a visual guide while passing the director. The mouth is held in the open position and a stab incision is made down to the ascending ramus of the mandible.

The director is then inserted (Fig. 7). The point of the director is held continually on the bone and a path is felt, not forced, until the director emerges through the sigmoid notch, when a second incision is made to allow the point of the director to emerge through the skin. The Gigli saw is then attached to the director and drawn back (Fig. 8). The saw is carefully used to avoid laceration and extension of the small incisions, but is under strong tension.

Fig. 10. Lateral oblique X-ray showing position of condylar head.

A few cuts with the saw, while the assistant holds the jaw against the pull, and the condyle neck will fracture. The external periosteum of the condylar neck is not cut through; this prevents too much displacement of the condylar head and the saw will not cut into the soft tissues in relation to the facial nerve. The Gigli saw is cut and removed, then the incisions are sutured; usually a single suture will be sufficient for each cut.

Intermaxillary fixation is achieved by using a pair of eyelet wires, the teeth being held in the occlusal, not in the rest, position, and a pressure bandage is applied for 24 hours. In the edentulous patient no intermaxillary fixation is used, but the dentures are immediately inserted after operation.

The X-rays show the postoperative position of the condylar head (Figs. 9 and 10). The intermaxillary fixation is maintained for five days and is then removed, and the patient encouraged to use the jaw normally.

Over 40 patients have had condylotomies carried out for arthrosis and we have reviewed 21 of them.

Number reviewed	21
(*a*) Males	5
(*b*) Females	16
Site (*a*) Right	15
(*b*) Left	8
Onset of Symptoms	
(*a*) Acute	13
(*b*) Gradual	8
Precipitating Trauma	
(*a*) Chewing	5
(*b*) Following extractions	4
(*c*) Yawning	1
(*d*) During sleep	1
(*e*) No history of trauma	10
Symptomology	
(*a*) Pain—clicking locking	18
(d) Ache and morning stiffness	2
(*c*) Recurrent dislocation	1
Duration of symptoms from six months to seven years. Average three years.	
Previous treatments:	
(*a*) Dentures	7
(*b*) Bite raising appliances	18
(*c*) Occlusal grinding	7
(*d*) Short wave diathermy	7
(*e*) Extractions	8
(*f*) Intermaxillary fixation	3
(*g*) Sclerosing of joints	2
(*h*) Orthodontic treatment	1
(*i*) Manipulation under G.A.	1
Result of previous treatment	Nil improvement

Loss of Molar Support		
Complete	Bilateral	5
No loss		6
Full dentures		4
Partial dentures		6
Excursion of affected Condyle		
Limited		14
Free		4
Excessive		2
Results of operation		
Up to 3 months—		
(*a*) Complete relief		6
(*b*) Clinical improvement		9
(*c*) Worse		1
3 months to 3 years—		
(*a*) Complete relief		6
(*b*) Continued to improve		8
(*c*) Deteriorated		Nil

Condylotomy has been used as an operative procedure to cure mandibular joint arthrosis when conservative methods of treatment have failed. In established cases when a permanent bite splint is necessary: when leaving out the splint leads to a recurrence of symptomatology, then I think a condylotomy would be preferable to premature loss of teeth through caries.

It is a simple operation to perform. The hazards are minimal. The stay in hospital is not long, an average of five days, and the two small scars on the face are not a cosmetic disfigurement.

We have only had one patient whose symptoms became worse after a condylotomy, and I am certain that improvement in this case will duly take place when he achieves his discharge from the Armed Forces. It would be fair to say if surgical interference is contemplated on a mandibular joint for arthrosis then, of all operations, condylotomy, even if it fails to improve the condition, will not leave the patient any worse off.

Mr. President, Ladies, and Gentlemen, I have described to you the three basic operations that are used at the Queen Victoria Hospital, East Grinstead, on the mandibular joint. I thank my colleagues at the Queen Victoria Hospital, East Grinstead, for their great help, not only in the treatment of the patients, but also in the preparation of this paper.

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THE LATE RESULTS OF PORTO-AZYGOS DISCONNEXION IN THE TREATMENT OF BLEEDING FROM OESOPHAGEAL VARICES

Hunterian Lecture delivered at the Royal College of Surgeons of England

on

12th May 1960

by

Norman C. Tanner, M.D., F.R.C.S.

Consultant Surgeon, Charing Cross Hospital; Surgeon, St. James' Hospital

In 1950, I mentioned during a discussion, which was published, an operation that I had used since 1948 in the treatment of bleeding from oesophageal varices. Because of the short period which had elapsed since the first operation I could not judge its merits, but now, ten years later, it is time to try to do so.

By 1950 we had begun to establish that a porto-caval anastomosis and to a lesser degree a spleno-renal anastomosis, carried out between episodes of bleeding, offered good protection against recurrent bleeding. We were, however, concerned as to its possible effects on liver function and because it led to an increase in portal systemic encephalopathy, the so-called " nitrogen intoxication ".

Because of these cerebral changes, because a shunt is unsuitable for active bleeding and because there were many cases in which a shunt was impracticable, it seemed that a further study of direct operations on oesophageal varices should be made. It was obviously desirable to evolve a method which would not only arrest bleeding in the acute phase but also give reasonable protection against future haemorrhage.

Past operations to stem acute bleeding had not been graced with much success. Splenectomy, ligature of the splenic or hepatic artery, or of the coronary veins, had been found ineffective or dangerous. More recently, Boerema (1949) and Crile (1953) had suggested and practised ligation of lengths of the oesophageal veins, after making a short incision in the oesophagus from a transthoracic approach. While this operation appeared to be effective in stopping bleeding temporarily, it was generally found that bleeding recurred after an interval of weeks or months (Linton, 1953).

Direct interval operations to prevent recurrent bleeding had also met with little success. I had tried and abandoned injection in or around the varices with a sclerosing solution via an oesophagoscope. The most successful operation up to that date was undoubtedly gastro-oesophageal resection, as recommended by Phemister and Humphries (1947). This

was generally deemed to be too major a procedure to use as an emergency operation, but certainly had, and retains, an important place in dealing with the interval case.

It occurred to me that an operation analagous to the Trendelenberg operation for internal saphenous varicosities might be attempted. In the case of the internal saphenous vein, the vein is ligatured at its junction with the femoral vein, the motive being to interrupt the gravitational and intra-abdominal pressures exerted on the saphenous vein. In the case of oesophageal varices, the interruption would have to be between the oesophageal and the portal venous systems, for it is the increased pressure in

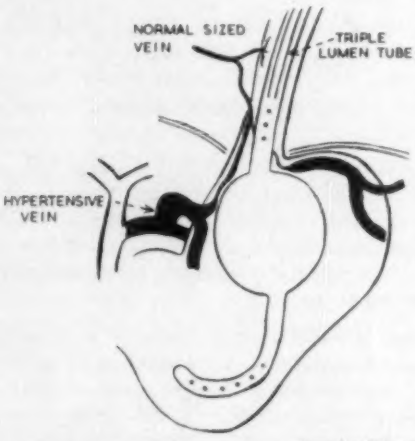

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Fig. 1. When traction is made on the intragastric balloon, the veins round the cardia are compressed between the balloon and the diaphragm. (From *Chirurgische Praxis* (1959) p. 169.)

the portal system which leads, not only to an increased *pressure* in the oesophageal veins, but also to vastly increased and so far unmeasured *volume* of blood flow through them escaping from the portal to the azygos and other systemic veins. Here the analogy between the two veins breaks down for the *volume of flow* in the varicose saphenous vein is slight.

Evidence that an interruption such as I had visualized might be of value was provided by the use of the gastric balloon in oesophageal bleeding. There is abundant clinical evidence that traction on an intragastric balloon stops bleeding from oesophageal varices. It is true that many models used in this condition have two balloons and the upper one, usually cylindrical in shape, is designed to press directly on the varices.

Nevertheless, it is the lower balloon which is the main factor in stemming the bleeding. When traction is made on it, the cardiac end of the stomach is compressed between the diaphragm and the balloon, so compressing the veins around the cardia (Fig. 1). This is in fact a form of porto-azygos venous interruption and I tried to reproduce this state of affairs surgically.

Operations to produce interruption of the collateral circulation of the oesophagus

Because the decision that bleeding from oesophageal varices was occasionally made during a laparotomy, the first operation devised was

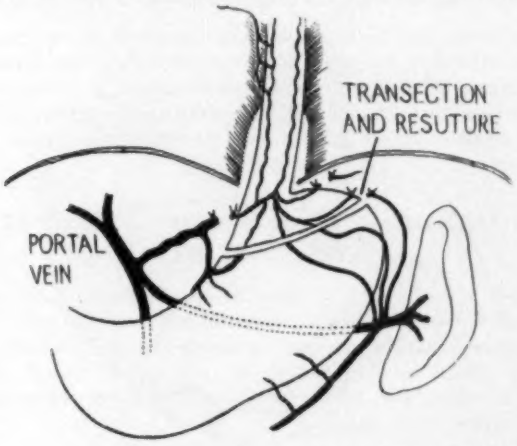

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Fig. 2. Diagram of subcardiac porto-azygos disconnection. (From *Medical Press* (1956) **236**, 36.)

one which would be carried out by an abdominal route. I described it as follows at a meeting of the Surgical Section of the Royal Society of Medicine (Tanner, 1950):

" Peri-oesophageal venous transection alone is inadequate. It is necessary that the emergency operation be one which can be performed by an upper abdominal incision, such as that used in exploring a case of haematemesis of unknown origin. Therefore I suggest (1) gastric transection and resuture to interrupt the venous circulation in the stomach; (2) division of all the vasa brevia to the upper part. This entails lifting the stomach forward after transection and dividing the occasional vasa brevia which run up the posterior wall of the lesser sac from the splenic trunk; (3) division of the left gastric pedicle, carefully sparing only the left gastric artery, in order to preserve a blood supply to the cardiac end of the stomach, but, of course, dividing the descending branch of the left gastric artery. Thereby there is complete division between the portal and azygos circulations."

However, at a later meeting of the same Society in 1954 I was able to report certain deficiencies in this operation as follows (Tanner, 1954):

"Unfortunately, some 3 or 4 of the cases eventually bled again. It was found by post-mortem vein injection methods that there was no appreciable flow across the gastric suture line eighteen months after transection and resuture, but venous connexions between the oesophageal veins and inferior phrenic veins around the cardia kept the pressure up in the varices, presumably because the inferior phrenic veins had become hypertensive. Therefore I modified the operation and since 1951 have carried out what is now a subcardiac porto-azygos disconnexion as follows: By an abdomino-thoracic approach the lower 5 cm. of oesophagus, the cardia, and upper 5 cm. of greater and lesser curve of stomach are entirely freed from all external vascular connexions. The stomach is then completely transected 5 cm. below the cardia and firmly resutured (Fig. 2). There is just enough blood supply from the oesophagus to nourish the small upper gastric segment. An attempt is made to preserve the hepatic branch of the anterior, and coeliac branch of the posterior vagus, but if the vagus has to be completely severed I add a Rammstedt type of pylorotomy."

It was obvious that my first operation was not in fact a complete porto-azygos disconnexion, and apart from the possibility I mentioned, that the inferior phrenic veins might have become hypertensive, there was also the possibility that oesophageal venous hypertension may have been maintained by small accessory gastric veins running directly from the cardiac end of the stomach to the hilum of the liver.

THE TECHNIQUE OF SUBCARDIAC PORTO-AZYGOS DISCONNEXION

I think it is important to describe the operative technique. Some surgeons have over-simplified a very difficult situation and have merely divided and resutured the stomach. Such a procedure would have only a temporary effect in diminishing the volume of blood through the oesophageal veins, and would probably not lower the *pressure* inside the oesophageal veins at all.

The operation is most easily carried out through an abdomino-thoracic incision, removing the ninth rib. The diaphragm need not be completely divided to the oesophageal hiatus, but complete division does make the operation easier. An abdominal approach is possible, but difficult if the liver is very large or very hard. In cases of extrahepatic portal hypertension, however, where the liver is normal, and particularly if the patient is slender, an abdominal approach is not so difficult. If such an approach is used it is best to remove the xiphoid process, and I have at times also split the lower half of the sternum. The left triangular ligament of the liver will have to be divided and the left lobe deflected to the right. An incision is made transversely through the phreno-oesophageal ligament and then a small incision made in the anterior margin of the oesophageal hiatus in the diaphragm, in order to expose the lower oesophagus.

The first step in the operation will be to free the greater and lesser curvatures of the upper 8 cm. of the stomach (Fig. 3). Whereas this may

be a matter of the greatest simplicity in a carcinoma case, in cases of portal hypertension the intense vascularization of the region, with oedema and thickening of the mesenteries and the close proximity of an enlarged spleen, may render it a slow and difficult dissection. If, as is sometimes the case, the spleen has been removed at a previous operation, then the dissection of the stomach from its vascularized adhesions to the diaphragm may be even more laborious. There are two methods of dealing with the upper lesser curvature. The first is to divide the lesser omentum up to the cardia (which involves division of the hepatic branch of the anterior gastric nerve), followed by ligature and division of the left gastric pedicle. This will include division of the left gastric artery, vein, lymphatics, the coeliac branch of the posterior gastric nerve and many

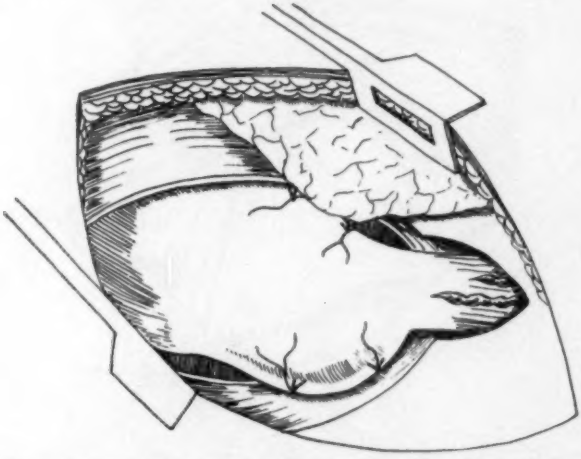

Fig. 3. Through an abdomino-thoracic incision the lower oesophagus, cardia and upper stomach are freed of all vascular or ligamentous connections.

sympathetic nerve fibres. This makes the stomach very free and easy to manipulate, and is probably the best method in the less vascular cases. A method which may be easier when the stomach is adherent or excessively vascular is to dissect close to the muscular wall of the lesser curve, making a division between the muscle wall of the stomach and the tissue in which the ascending branch of the left gastric artery runs. This will involve meticulous dissection, with double ligature and division of the branches of the left gastric artery and vein just as they enter the stomach. This dissection must extend round the cardia, and up the oesophagus for some 6 cm. above the cardia. In most cases the vagus nerves are divided, though I have spared the coeliac branch at times. A notable vein may be seen to be running with the coeliac nerve in some cases.

Having freed the lower oesophagus, the cardia and the upper stomach from all vascular or other external connections, the stomach is clamped in two Payr clamps 5 cm. below the cardia, and the stomach divided between the clamps (Fig. 4). The distance of 5 cm. is measured from the cardia down the lesser and greater curvatures of the stomach and is chosen as being certain to be below the sometimes bulbous lower ends of the oesophageal varices. It is a length which I have found by experience to be safe to leave, and apparently just enough blood comes through the isolated oesophagus to nourish it.

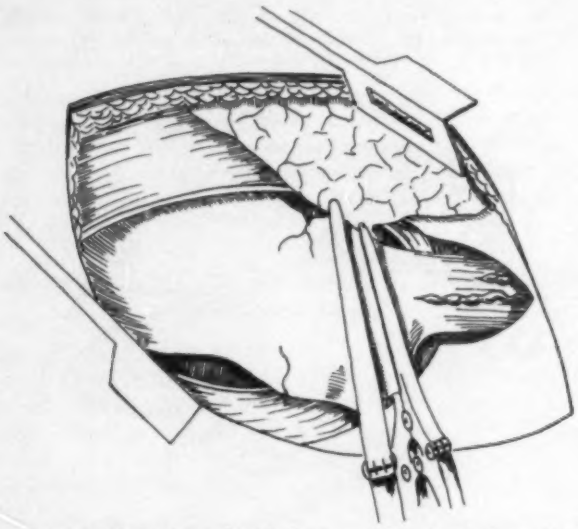

Fig. 4. The stomach is clamped with Payr crushing clamps 5 cm. below the cardiac orifice of the stomach, and divided between them.

All that now remains is to anastomose the divided ends of stomach. In practice this is a little difficult because it will be found that the upper cut end is much shorter than the lower one. An additional difficulty is that the lower cut end is not very mobile as a result of the limited freeing of the lesser curvature which may have been carried out. A simple method of overcoming both of these difficulties is to close the lesser curve part of the lower incision (Fig. 5) and to anastomose the upper end to the outer two thirds of the lower end, which will then be found to have become more mobile and of a more suitable length (Fig. 6). Because the viability of the upper gastric segment must be diminished, it is well to suture the two in such a way that the upper segment is almost buried under the lower segment (Fig. 7).

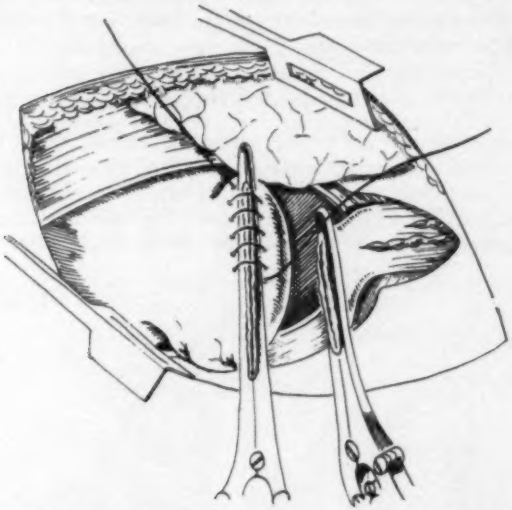

Fig. 5. The medial part of the lower cut end of the stomach is closed with two layers of catgut.

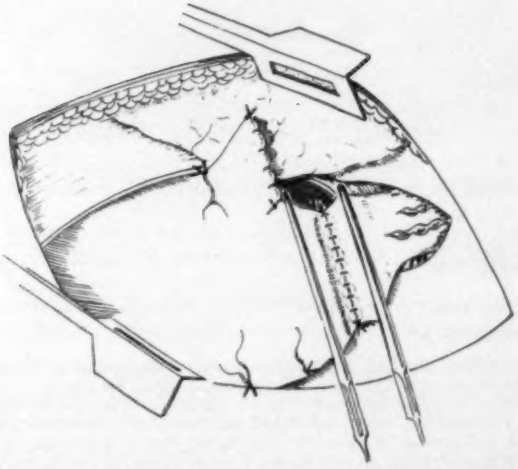

Fig. 6. The remaining open ends of the stomach will now be of similar width and more mobile. A two-layer catgut anastomosis is carried out between them.

Following this a pyloroplasty or gastro-jejunostomy may be carried out and the diaphragm and wound repaired. If the pleural cavity has been opened a chest drain is inserted.

COMPLICATIONS

The degree of disturbance to the patient will depend on his state at the time of operation. Many are acutely bleeding or anaemic, and worse still some are suffering from the effects of blood inhalation and pneumonia, or of ammonia intoxication from the presence of blood in the intestine. For the interval case the amount of blood lost during the operation will be the

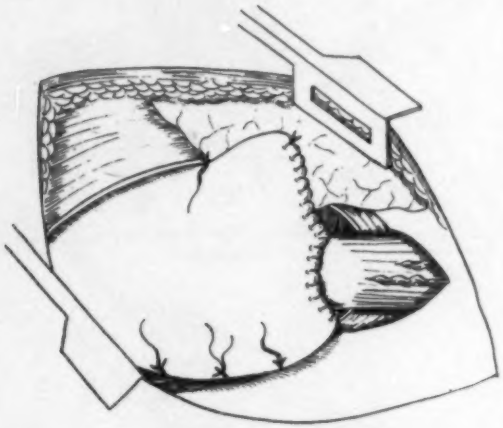

Fig. 7. When the anastomosis is complete, the upper gastric segment is almost buried under the lower one.

main disturbing factor and it is very important to replace any blood as rapidly as it is lost.

Vagotomy symptoms

Because the vagus nerve fibres running through the stomach and into the lesser omentum are divided, severe delay in gastric emptying may occur.

R. P., age 12, was admitted to St. James' Hospital in January 1956 with a history of repeated haematemesis. He had had a splenectomy at the age of 3, and at the age of 6 a laparotomy had disclosed a cavernoma of the portal vein. On 30th January 1956, the fourth day of bleeding, I operated on him and carried out a subcardiac porto-azygos disconnexion. Following this the bleeding ceased, but he developed severe delay in gastric emptying with bouts of vomiting. This persisted for seven weeks, and so at the end of this time a laparotomy was carried out and a pyloroplasty made. He was discharged three weeks later and since then has been well with no further bleeding.

Most patients, aided by a few days' decompression by a gastric tube, have regained their normal emptying rate and no gastric drainage procedure has been necessary. In many interval cases, however, provided the patient is reasonably fit by the time the disconnexion is completed, a Rammstedt pylorotomy, a Heineke Mikulicz pyloroplasty, or a gastrojejunostomy is carried out to prevent this complication.

Ascites

Because an important collateral circulation has been divided, ascites might be expected to occur. In practice mild degrees of ascites have

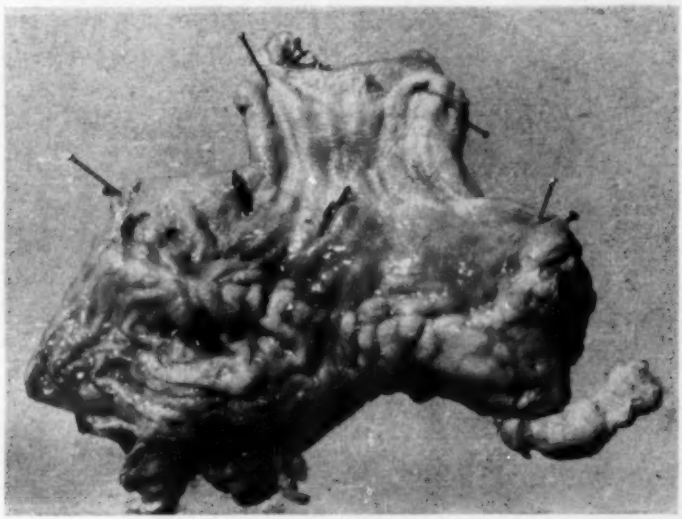

Fig. 8. *Case of S. O'C.* Persistence of non-absorbable sutures in the gastro-gastric suture line 19 months after disconnexion, leading to recurrent bleeding.

occurred or persisted, but have usually cleared up once adequate feeding was re-established except in those cases where ascites was troublesome prior to the operation.

Reflux

As a result of the damage to the phreno-oesophageal ligaments and to the margins of the oesophageal hiatus in the diaphragm caused by this operation, one might expect reflux of gastric juice and heartburn to follow. Heartburn is occasionally complained of and it is possible that a reflux oesophagitis may in part account for some of the cases of milder bleeding that have occurred after porto-azygos disconnexion.

Ulcers due to the use of non-absorbable suture material

In some of the earlier cases, in an endeavour to discourage the development of a collateral circulation across the gastric suture line, fine silk or thread was used as a firm continuous suture on the inner layer of the anastomosis. Now in 1951 (Tanner, 1951) I recorded a series of cases in which ulceration occurred months or even years after gastrectomy, as a result of using continuous fine non-absorbable suture material on the mucosa, the ulcers appearing at the site of the knot and leading to severe bleeding. Indeed I went to the length of adapting my gastroscope with an instrument to extract silk knots from the stomach. It is therefore not surprising that some of the disconnexion cases also developed silk ulcers.

S. O'C., aged 23, a nurse, was admitted in September 1952 with massive and repeated haematemesis and melaena. A splenectomy had been carried out on her at another hospital when she was 18. She had severe oesophageal varices. On 9th September 1952 a subcardiac porto-azygos disconnexion was carried out. She was well for 19 months and then had a moderate-sized haematemesis. She was re-explored in June 1954. There was cavernomatous replacement of the portal vein. A resection of the upper stomach and lower oesophagus was therefore carried out and an end-to-end anastomosis made. The specimen showed the presence of persisting silk sutures projecting into the stomach (Fig. 8). The varices were barely noticeable.

Following this the patient has married, had a child, and has no disability beyond occasional slight heartburn.

Since then we have therefore made the anastomosis using two layers of chromic catgut.

Gastric ulcer possibly due to gastric retention

One fatal haemorrhage came into this category.

E. N. M., aged 64, was admitted to St. James' Hospital in May 1952 with a history of three severe haematemeses in eighteen months due to cirrhosis of the liver with oesophageal varices. On 15th May 1952 I carried out a subcardiac porto-azygos disconnexion. Following this the oesophageal varices were seen to be less prominent and less congested. A year later she had had no further bleeding but it was noted that she had gross gastric retention. In September 1953 she had a severe haemorrhage and died in another hospital. At the autopsy it was found that she had four ulcers in the stomach, all on the gastro-gastric suture line.

Collateral circulation across the suture line

It was thought that the porto-azygos disconnexion as described might be limited in its effects by the development of a collateral circulation across the gastro-gastric suture line. This has proved to be the least well founded of our worries.

In patients dying one or more years after operation, no appreciable growth of new vessels across the suture line is seen microscopically or macroscopically, nor can any be found by injection of dye. Gastroscopic examination one or more years after operation also shows no evidence of any visible submucosal vessels on or near the suture line.

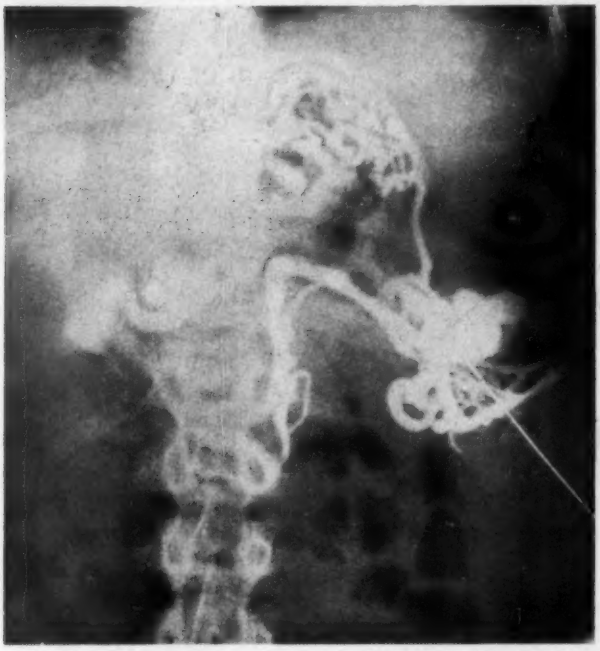

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Fig. 9. Spleno-venogram twelve months after subcardiac porto-azygos disconnexion. It is seen that none of the opaque fluid passes the gastric suture line into the oesophagus. (From *Chirurgische Praxis* (1959) p. 175.)

Finally a splenovenogram made eighteen months after operation shows abrupt limitation of the opaque fluid in the region below the suture line (Fig. 9).

OTHER METHODS OF PORTO-AZYGOS DISCONNEXION

There are many other methods of producing porto-azygos disconnexion.

Combined with subtotal gastrectomy

This method obviates the post-vagotomy effects on the stomach, the risks associated with acid reflux into a highly vascularized oesophagus, and the danger of having overlooked a concomitant peptic ulcer. The stomach is mobilized as for an ordinary Polya gastrectomy, the mobilization including the whole stomach, the cardia and the lower 5 cm. of oesophagus. The duodenum is transected and closed, the stomach is tran-

sected 3 cm. below the cardia and removed (Fig. 10). A gastro-jejunal anastomosis is made (Fig. 11). It is not safe to leave 5 cm. of the stomach in this operation, because the gastric remnant is not so well buried during a gastro-jejunal anastomosis as it is in a gastro-gastric anastomosis. In one case in which 5 cm. was left a small area of necrosis appeared near the suture line on the greater curve side, leading to a subphrenic abscess.

Oesophago-jejunal anastomosis

Another method, which has the advantage of avoiding dissection near the vascular region below the cardia, is to transect the oesophagus and

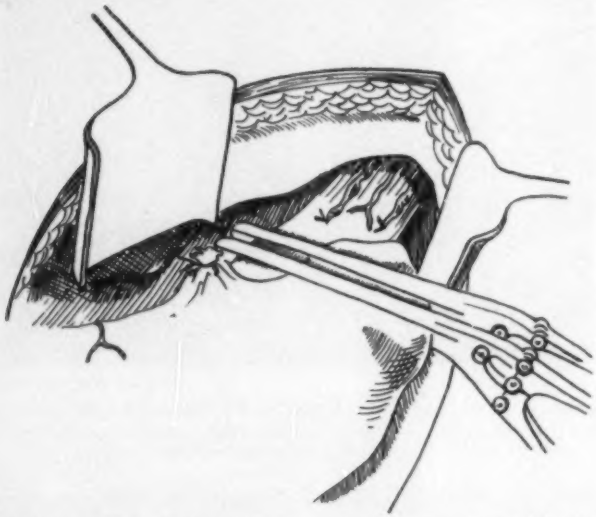

Fig. 10. The stomach, cardia and lower oesophagus are devascularized through a high abdominal approach. The stomach is clamped and transected 3 cm. below the cardia.

perform an oesophago-jejunostomy. For this an abdomino-thoracic incision is made, the lower oesophagus is mobilized and transected at the cardia. The lower end is closed and inverted into the stomach (Fig. 12). It is wise to avoid leaving any *oesophageal* mucosa inverted into the stomach, hence the transection should be *at* the cardia. A Roux-en-Y loop of jejunum is now constructed and brought through a separate opening made in the diaphragm and united to the oesophagus (Fig. 13). The Roux loop may be brought up behind or in front of the pancreas, and through the transverse mesocolon. The retention of the defunctioned stomach has so far not been known to give rise to any complications.

Oesophago-gastrectomy

Another method of disconnexion is of course to carry out an oesophagectomy, removing the lower or the whole thoracic oesophagus, and restoring continuity by either oesophago-gastric anastomosis, or by replacing the oesophagus with colon. It is perhaps stretching the point

Fig. 11. Following transection and removal of the lower stomach, a gastro-jejunal anastomosis is made, followed by entero-anastomosis. A Roux-en-Y loop of jejunum may be used as an alternative.

a little to regard this as a variety of porto-azygos disconnexion. Nevertheless, a disconnexion occurs in the operation.

Next, I will mention some methods of porto-azygos disconnexion that I have so far not carried out.

Replacement of oesophagus by a plastic tube

Since Berman (Berman, 1952) suggested the replacement of segments of oesophagus by a plastic tube it has seemed to me that in theory this method should be ideal for oesophageal varices, for varicosities would be unlikely to grow in the length of granulation tissue which develops outside the tube.

Fig. 12. The lower oesophagus is devascularized and transected at the cardia. The lower divided end of the oesophagus is closed and invaginated into the stomach. A Roux-en-Y loop is constructed.

The reason that I have not used plastic tube replacement of the lower oesophagus for oesophageal varices was that I found in carcinoma cases a notable morbidity as a result of mediastinal infection at the point where the upper end of the tube was attached to the oesophagus. I have experimented with softer tubes using stiffened extremities, but have so far not

felt that the method was safe enough to use in cases of oesophageal varices. Terracol and Sweet (1958) also report unhappy experiences with the plastic tube. However, I notice that Dr. M. N. Nachlas (1956) has made a plastic tube replacement in five cases of massive bleeding with three survivals of 9, 10 and 13 months respectively.

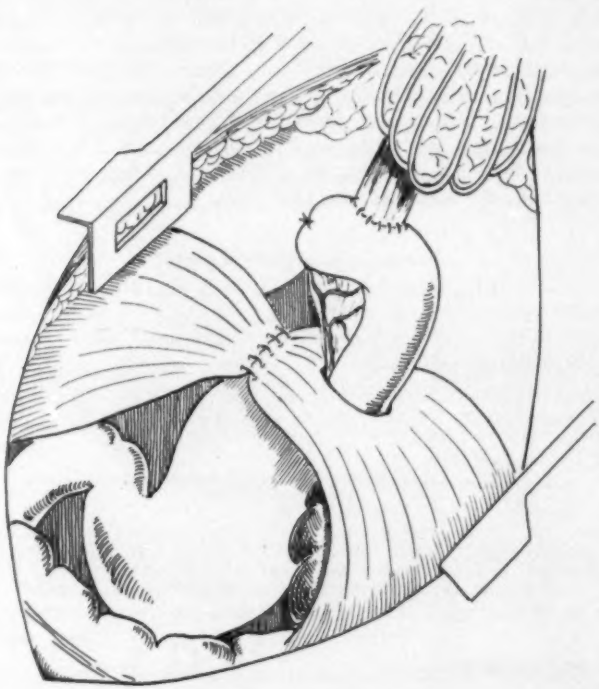

Fig. 13. The Roux-en-Y loop is brought up through a separate opening in the diaphragm and anastomosed to the cut end of the devascularized oesophagus.

Oesophageal transection

Professor Milnes-Walker of Bristol has practised transection and resuture of the oesophagus instead of the upper stomach, because of its greater ease and speed of performance. The disadvantage would be the diminished security of oesophageal anastomosis and the fact that the lowest varices remain in the hypertensive area, though the volume of blood flow through them would be reduced.

" Dissektionsligatur "

Professor Dr. Vossschulte (1957) of Giessen transects the veins of the lower oesophagus by a method of his own. The lower oesophagus is exposed after making a transverse abdominal incision extending into the left costal margin. An incision is made round the muscularis of the lower oesophagus down to the mucosa. A high gastrotomy is made and through this is introduced a hollow ring-shaped prosthesis with an outer groove, on a special introducing forceps. The prosthesis rather resembles one-half of a Murphy button. A tight encircling ligature round the mucosa compresses the veins against the groove in the prosthesis. The muscularis is carefully repaired. A few days later the mucosa sloughs and the prosthesis is extruded. Stenosis of the oesophagus may follow this, but in 15 survivors of the procedures up to date there has only been one who bled again.

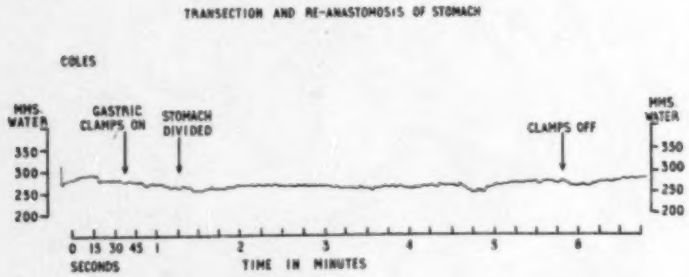

Fig. 14. Continuous portal pressure record during subcardiac porto-azygos disconnexion. This was made by my former Senior Registrar, Mr. Cyril Shaldon, while working in Professor R. Milnes-Walker's clinic at Bristol.

Accessory procedures

Portal hypertension is a complex condition, particularly when due to liver disease, and disconnecting the oesophageal varices from the portal circulation does not answer all the problems, though, if successful, it deals with the most urgent risk to life.

In theory the portal pressure should rise after disconnexion, though this has not been proved, and continuous records of the portal pressure during the operation, made in Professor Milnes-Walker's clinic, show no notable rise (Fig. 14). In some cases I have compensated for this by tying the left gastric and splenic arteries and reducing the portal inflow. In other cases we have added a spleno-renal anastomosis, though this made the operation somewhat formidable.

Splenectomy

We have usually left the spleen *in situ*, with the intention of keeping it for subsequent spleno-renal anastomosis in the event of failure of the disconnexion. We only remove the spleen during disconnexion if there is a marked thrombocytopenia, if the presence of the spleen causes operative difficulties or if it suffers damage during the disconnexion. Whenever it is removed the advisability of coincident spleno-renal anastomosis should be carefully considered, particularly if there is any ascites, or if the portal vein itself is not patent.

In view of the tendency of these patients to develop portal thrombosis splenectomy introduces a risk of splenic vein thrombosis, which may be followed either by portal vein thrombosis or of the occurrence of portal embolism (" Zahn's infarcts ") in the liver (Symmers, 1951). This complication contributes to hepatic failure.

Ascites

In the presence of associated oesophageal bleeding and severe ascites it is usually wiser to carry out side-to-side or end-to-side porto-caval anastomosis. We have tried the Crosby-Cooney button (Crosby and Cooney, 1946) without success. We have used sapheno-peritoneal anastomosis in three cases with failure in one, modified success in one, and outstanding success in one case of chylous ascites without portal hypertension.

RESULTS

Following my demonstrations of this operation over ten years ago, and talks on the operation during a tour of the United States, many surgeons gave it repeated trials, for then, as even now, we are far from having reached unanimity on the most satisfactory surgical method of dealing with these cases.

I have already mentioned that the results of the first operation which left the cardia and its collateral circulation undisturbed were highly unsatisfactory. Professor Milnes-Walker, who kindly placed his figures at my disposal, tells me that all the survivors of his 13 cases treated by gastric transection without devascularization had recurrent bleeding.

The results of the subcardiac transection which was used since 1949 were much better, no doubt because the devascularization was carried up to and above the cardia.

Before giving details of the results, I would like to make some general remarks. Any new surgical procedure may be followed by failure and disappointment. This may be because the logic of the operation is faulty, or because some complicating factor has not been dealt with. We all

remember that vagotomy was abandoned in 1912 because of the failure to deal with the complication of gastric stasis and eructation.

Therefore I have endeavoured to analyse the bad results and correct their cause as far as possible.

I will first of all give my personal results, in cases of total portal hypertension, complicated by massive bleeding and operated on between 1950 and October 1959 (minimum follow-up six months).

TOTAL CASES OF COMPLETE PORTAL HYPERTENSION OPERATED ON FOR MASSIVE BLEEDING (1950–1959)

Cirrhosis	Alcoholic	12
	Bilharzial	7
	Wilson disease	2
	Other	25
Extrahepatic portal vein block		12
TOTAL		58

For comparison I will record the results in those patients who had shunt operations.

VENOUS SHUNTS (1949–1959)

	No.	*Post-operative death*	*Late death*	*Encephalopathy*	*Recurrent bleeding*
1. *Porto-caval anastomosis*	21	2 (9.5%)	6	9 (3 fatal)	2
2. *Spleno-renal shunt*					
(*a*) Alone	3	2	0	0	0
(*b*) Combined with disconnexion	3	0	0	1 (minor)	1 (minor)
TOTALS of all shunts	27	4	6	10 (3 fatal)	3

It will be seen that recurrent bleeding is unusual, about 10 per cent., but when it occurs it tends to cause liver coma. The worst feature is nitrogen intoxication or encephalopathy in 10 out of 23 survivors, leading to death in three. Many are remarkably well, however, and lead normal lives. Next, I will record in similar fashion the results of subcardiac porto-azygos disconnexion.

PORTO-AZYGOS DISCONNEXION WITH SUBCARDIAC TRANSECTION (1949-1959)

Cause of Hypertension		*No.*	*Post operative death*	*Encephalo-pathy*	*Major bleeding*	*Minor bleeding*
Cirrhosis	Emergency	11	4	2	2	1
	Interval	14	0	1	2	6
Extra-hepatic	Emergency	2	0	1	1	0
	Interval	5	0	0	3	1
	TOTALS	32	4	4	8	8

Of these patients, 11 have died at intervals between one and six years from their operation. Several of the late deaths were due directly or indirectly to the recurrent haemorrhages noted above and so I append the causes of the late deaths.

LATE DEATHS (11) AFTER SUBCARDIAC PORTO-AZYGOS DISCONNEXION

Haemorrhage (6 cases)	
Gastric Ulcer	1
Following second operation for bleeding	3
From caecal varices	1
? From oesophagus (? silk ulcer)	1
Thrombosis of portal vein	1
Encephalopathy	1
Liver failure	1
Epilepsy	1
Suicide	1
TOTAL	11

Note. Of the five latter deaths only one had a haemorrhage following the operation. The case of encephalopathy had had a subsequent porto-caval anastomosis for ascites.

It is possible that some of the earlier haemorrhages occurred as a result of using non-absorbable suture material, or from ulceration due to gastric stasis. This problem is now dealt with by the abandonment of non-absorbable suture material, and drainage of the stomach by gastro-jejunostomy or pyloroplasty.

Perhaps it will help to simplify these figures if I give the present state of health of the 17 survivors of subcardiac disconnexion.

SURVIVORS OF SUBCARDIAC DISCONNEXION

	Well	*Well but has had minor episode of bleeding*	*Recurrent severe bleeding*
Disconnexion alone	6	4	1
Disconnexion + spleno-renal anastomosis	2	1	0
Disconnexion followed by porta-caval anastomosis (2 cases) or oesophago-gastrectomy (1 case)	2	1	0
TOTALS	10	6	1

Note. The two porta-caval anastomoses were for ascites.

Some of these minor haemorrhages are associated with heartburn or over-use of alcohol. Such minor blood losses do not require the use of the Sengstaken balloon, but two to three days' bed rest with alkalies and a milk diet.

I will next recount the experiences of other surgeons who have detailed their figures. W. P. Mikkelson and A. C. Pattison (1959) have carried

out five of the subcardiac disconnexions with recurrent bleeding in four cases, and so declare it useless in their hands.

Professor R. Milnes-Walker carried out the subcardiac transection with devascularization in five cases, with one death; the four survivors had not bled again. He has modified the operation by making an oesophageal transection in 10 cases, with two deaths due to very poor liver function and, of these, five have bled again. He is at present using a simple oesophageal mucosal transection with promising results (Milnes-Walker, R., personal communication).

Mr. Alan Hunt has used this form of disconnexion on 13 cases with recurrent bleeding in eight, one post-operative death and four are satisfactory (Hunt, Alan, personal communication).

OTHER FORMS OF DISCONNEXION USED

A short note on our experiences with other forms of disconnexion may be of interest.

Oesophageal mucosal encircling ligation

Only one such procedure was used, in 1948, and bleeding recurred later. It is my opinion that to prevent late bleeding every vein connecting the portal and azygos systems, even the invisible ones in the oesophageal muscularis, must be transected, for they are capable of great dilatation and can once more transmit hypertension and a large volume of blood into the mucosal veins above the mucosal transection.

Low oesophageal transection and oesophago-jejunostomy

This has only been carried out five times, three being within the last six months. Of the earlier cases, one operated on three years ago is well except for occasional haemoptysis, possibly the result of the pulmonary arterio-venous shunts which at times occur in portal hypertension (Georg *et al.*, 1960). The second case merits a short record because it demonstrates the difficulties of these cases.

R. L., aged 28, admitted in March 1953, gave a history of a prolonged illness due to appendicitis in 1940. We assumed later that this led to portal vein thrombosis. In 1944 he had his first haematemesis and in 1947 a splenectomy was carried out. At operation on 24th March 1953 the portal vein was found to be thrombosed and so a subcardiac porto-azygos disconnexion was carried out. Melaena occurred nine months later and the oesophageal varices were injected with sclerosing solution. In September 1954, on account of a recurrent bleeding, the oesophagus was transected and a Roux-en-Y loop of jejunum brought up and united to the end of the oesophagus.

He remained fairly well for six years with an excellent nutrition and appetite, though with occasional melaena and slight haematemesis. Severe bleeding recurred in December 1959 and so he was operated on again. The oesophagus was exposed from the right thorax, a 10 cm. incision made into it and the varices, which appeared intact, were ligatured over a distance of 12–14 cm. A few days later bleeding recurred, mainly melaena. A laparotomy disclosed that the blind sac of stomach was collapsed

and empty of blood, but the bowel was full. A very large tributary of the superior mesenteric vein was found and a wide anastomosis made between it and the end of the left renal vein after nephrectomy. A few days later catastrophic bleeding recurred. By this time he had had transfused 76 pints of blood. The whole oesophagus was then excised with the idea of a later reconstruction with colon. He stood this well, but a few days later had a further massive haemorrhage and died.

At autopsy the jejunal-renal venous anastomosis was wide and patent, demonstrating the comparative uselessness of such shunts. The site of bleeding was the caecum. Adhesions following the appendicitis of 1940 had led to the development of varicosities between the caecum and the parietes, and a few superficial caecal erosions in this highly vascular area had led to his exsanguination.

Oesophago-gastrectomy

Only one oesophago-gastrectomy with oesophago-gastric anastomosis was carried out in this series, the case already described.

Mr. Alan Hunt tells me that he has carried out 23 such resections with nine complete and seven partial successes. He finds the morbidity of this operation considerable as a result of weight loss, stricture formation, fistula, subphrenic abscess and bilious regurgitation.

Oesophago-gastric devascularization, subcardiac transection and gastro-jejunal reconstitution (with subtotal gastrectomy)

This is the operation we are now using, for the reasons previously mentioned, and have carried out so far on five cases. It is too early to assess it. It is most important to add that a very high gastrectomy alone, which leaves 50 per cent. of the porto-azygos collateral circulation intact, is not an adequate procedure.

CONCLUSION

The first conclusion I must make is that all these operations can at times be very difficult and hazardous.

There would seem to be a place for some form of porto-azygos disconnexion as an emergency operation in cases of acute bleeding, and as an interval operation in cases of recurrent bleeding from oesophageal varices where a porta-caval or spleno-renal shunt is impracticable, or where some degree of nitrogen intoxication (encephalopathy) exists.

Such operations should be carried out at an early stage, as soon as it is evident that bleeding is recommencing after 24 hours' balloon tamponade.

Vagotomy symptoms of gastric obstruction may follow porto-azygos disconnexion.

Non-absorbable sutures must not be used on or near the suture line.

Minor haemorrhages, not requiring the use of balloon tamponade, may be expected to occur in over 33 per cent. of subcardiac porto-azygos disconnexions. An attempt is being made to reduce their number by making the anastomosis between the devascularized cardiac end of the stomach and the jejunum.

Subcardiac porto-azygos disconnexion gives greater protection against recurrent massive bleeding than simple ligation of the varices.

A high protein diet may be given after porto-azygos disconnexion with little risk of encephalopathy.

In carrying out such procedures as these we have all been encouraged by John Hunter's advice to " try the experiment ". It is no less important to follow his methods of careful inductive reasoning based on a patient study of the outcome of the experiments.

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GRANT OF DIPLOMAS TO FELLOWS IN DENTAL SURGERY

AT THE FINAL EXAMINATION for the Fellowship in Dental Surgery held in January, 11 candidates out of 34 were successful.

At the meeting of Council on 9th February, Diplomas of Fellowship in Dental Surgery were granted to the following:

LOWENBERG, Beate Franziska (*The London*).
CHAPMAN, Anthony John (*Guy's*).
SHORT, Aubrey Gordon (*New Zealand*).
KIRKWOOD, John (*Sydney*).
VAN WYK, Christian Werner (*Pretoria*).
NEWELL, Michael John (*Leeds*).
EMERSON, Thomas George (*Belfast*).
HOPKINS, Russell (*Durham*).
WREAKES, Glyn (*Leeds*).

JOHN HUNTER'S MICROSCOPE SLIDES

Arnott Demonstration on 22nd June 1960

by

Jessie Dobson, B.A., M.Sc.

Curator of the Anatomical Museum

IN 1840, JOHN THOMAS QUEKETT was appointed to a three-year Studentship in Human and Comparative Anatomy at the Royal College of Surgeons, and at the end of this period he was promoted to the post of Assistant Conservator. William Clift had retired in the previous year, thus concluding half a century's care of John Hunter's museum, and his son-in-law, Richard Owen, then assumed the office of Conservator. Although much of Quekett's work consisted in preparing, repairing and mounting dissected specimens, his main interest was microscopy and he had, with great care and diligence, made various groups of slides illustrative of and supplementary to the main series of gross anatomy and pathology, and these, numbering some 2,500, were purchased by the College in 1846. Clift, Owen, Paget and others had then been occupied for many years in compiling catalogues, since it was not only considered requisite that complete and accurate records should be kept of each item in the museum, but also that a full description of the contents should be made available to scientists and other interested persons, both in this country and abroad. Quekett was accordingly requested to begin the preparation of similar volumes relating to the microscopical specimens, and in 1850 the first *Descriptive and Illustrated Catalogue of the Histological Series contained in the Museum of the Royal College of Surgeons* was issued. This contained descriptions of 1,166 items, and in the Preface is the following statement:

> " The Council deem it worthy of notice, in connection with the manifold obligations which science owes to John Hunter, that the nucleus of this series, consisting of 150 specimens, prepared by William Hewson, constitutes an original portion of the Hunterian Collection."

No other reference to this " nucleus " occurs in the catalogue and the reader is left in doubt whether the specimens so designated were included or not. Five years later, a second volume of this part of the catalogue was issued, containing descriptions of a further 945 preparations; no mention is made of the Hewson slides. The cost of publication of these two volumes amounted to more than £600.

In 1856, a year after the publication of the second volume of the Histological Catalogue, John Thomas Quekett was appointed Conservator of the Hunterian Museum in succession to Richard Owen, who had resigned this post in order to take the office of Superintendent of the Department of Natural History at the British Museum. Possibly owing to additional duties and responsibilities and increasing ill-health, no further

sections of the Histological Catalogue were completed though the draft manuscript and some of the illustrations of the third volume were prepared. Now, more than a century later, it is not readily appreciated that the two printed catalogues refer to only part of the histological collection, which includes some 10,000 preparations. Furthermore, even if the reader were one of the virtuous few who read Prefaces, it might be assumed, with reason, that the specimens prepared by William Hewson, deemed worthy of special mention in the first volume but ignored in the second, were dispersed throughout the general series and their identity lost, a deplorable but all too common occurrence in museum history.

Quekett's microscopical preparations fortunately escaped damage during the bombing of the College and the subsequent vicissitudes endured by the main College collections and, after the cessation of hostilities, they remained packed in parcels awaiting the time when the other sections had been rehoused, checked and recatalogued. Chance efforts were made from time to time to locate the Hewson slides which, it was hoped, might be identified in some way such as the method of mounting; but these produced no result.

When systematic checking began, it was soon found that the printed catalogue was incomplete and reference was then made to the manuscript ones. There were three sets of these, the first of which consisted of Quekett's draft of the third volume. With this was a list of the Hewson slides, together with some notes prepared by Mr. R. H. Burne. It was found, however, that the numbers in no way corresponded with the specimens. The two other sets of manuscript catalogue were then consulted. These were in bound volumes, duplicates in content, and were at once seen to correspond with the slides which were then easily checked. Reference to the Hewson collection was located under the heading: " Microscopic Preparations made by Hewson, purchased by John Hunter at a sale of Mr. Hewson's Museum ". The two sub-headings: " Portions of Tissues preserved in Spirit and put up in Hermetically sealed glass tubes " and " Portions of Tissues injected and put on glass slides and dried " provided the guide to the specimens which were found to number 103, 55 in the " hermetically sealed glass tubes " and the rest " put on glass slides and dried ". Further search through the manuscripts revealed that there were originally 217 of these Hewson preparations, 70 in spirit and 147 dried, so that at the time that Quekett wrote the introduction to the Histological Catalogue, Volume I, 67 of them had already been discarded.

After the death of Quekett in 1861, one of his former assistants was engaged to set in order and complete the catalogue of the collection. This was James Murie, born in Glasgow on 30th March 1832, where he gained his M.A. and L.F.P.S.G. On 11th February 1858 he was appointed

second assistant in the museum of the College and during the next two years he made a special study of the aquatic mammals. Indeed, he received the distinction of being mentioned by Charles Darwin in the sixth and last edition of his *Origin of Species* for his work on the modification of old age on the skull of seals (1872, Chapter VI, Modes of Transition). He resigned from his post in February 1860 and for the next three years travelled in Europe and Africa, visiting anatomical museums, and collecting plants, reptiles and fishes. He received no recognition for the fine work he did on these expeditions and this seems to have embittered his whole outlook and attitude to life. In October 1863, he asked to be allowed to repair and recatalogue Quekett's collection, the agreed fee being £200. The task occupied the next two years and he reduced the

Fig. 1. William Hewson (1739–1774).

series by about half, leaving some 10,000 slides, including 103 of the Hewson preparations. The remaining 47 he reported as being useless; and it is this group of 103 that now remains. At the same time, John Tomes was requested to work on the completion of the third volume of the printed catalogue; but once again the task was left unfinished.

The rest of the story is a matter of medical history. William Hewson (Fig. 1), son of a surgeon-apothecary of the same name, was born at Hexham in Northumberland on 14th November 1739 and began his medical training with a Mr. Lambert, a surgeon in Newcastle. At the age of 20 he came to London, joined classes at Guy's and St. Thomas's Hospitals, and attended William Hunter's lectures; and he lodged with John Hunter at the house in Covent Garden. When John left two years later to serve

in the Seven Years' War, Hewson's diligence and skill earned him the privilege of taking his place as William Hunter's assistant and he was able to gain money " at an age when most students in surgery are only spending it " (John Coakley Lettsom). Hunter, in fact, thought so highly of him that he suggested that if Hewson would study for a year in Edinburgh, he would take him into partnership on his return. So, in 1761, Hewson went to Edinburgh and on his return rejoined William Hunter, first as his assistant, and quite soon as his partner, taking a share in the profits of the school. Hunter had vacated his premises in the Great Piazza, Covent Garden, on Lady Day, 25th March 1761, and in May 1763 he took a small house in Litchfield Street, where the classes were conducted and where Hewson and some of the pupils lodged until the autumn of 1767. In

Fig. 2. Benjamin Franklin.

June of the following year, William Hunter took up residence in Windmill Street, where Hewson soon joined him. In this house, built to Hunter's own requirements, besides a handsome amphitheatre and other convenient apartments for lectures and dissections, there was " a magnificent room fitted up with great elegance and propriety as a museum ".

It was in 1768 that William Hewson became acquainted with Mary Stevenson, his future wife. In a letter written by her many years later, on 30th August 1782, to Dr. Samuel Foart Simmons, she remarks: " Some similarity in our dispositions created a mutual esteem, and the equality of our situations made our union desirable in point of prudence. I had five months start of him in age, no pretensions to beauty, nor any splendid fortune; yet I believe he was satisfied with the choice he made." They were married on 10th July 1770, and spent their honeymoon at Hexham, where his mother was still living, though his father had died

three years previously. Mary Stevenson was a close friend of Benjamin Franklin, who, with his son William and their negro servant, had lodged with her mother, Margaret Stevenson, in Craven Street, Strand, during the 15 years of his stay in London, from 1757 to 1762, and from 1764 to 1775 (Fig. 2). Indeed, it seems that Franklin would have been well pleased had his own son married her.

Hewson's first published work was on " The Operation of Paracentesis Thoracis, proposed for Air in the Chest; with some remarks on the Emphysema and on Wounds of the Lungs in General ". This was read on 15th June 1767 by William Hunter to the Society of Physicians in London, and published in their *Medical Observations and Enquiries* (Vol. iii, pp. 372–96). It was his next series of investigations, however, which brought him distinction and also into a bitter controversy with no less a person than Alexander Monro, secundus. The cause of the dispute was the question of priority in the discovery of the lymphatic system in the lower vertebrate animals. In 1768, Hewson spent some time at Brighton, where he carried out experiments on " Kingston, or monk-fish, a species of skate ", for the purpose of finding out whether a lymphatic system existed in fish. He had already used small live fish from London markets, but he had no success with these or with larger dead ones. After many failures, both with skate and cod, he was " at last so fortunate as to discover the lacteals and get a pipe into one of those vessels on the mesentery of each of these fish; and, injecting by this pipe, I found where the larger vessels lay; after which there was but little difficulty in tracing the whole system ".

The results of these enquiries into the lymphatic system in amphibia and in fish were read by William Hunter at meetings of the Fellows of the Royal Society on 9th and 16th November 1769; and in the Journal Book of the Society (Vol. 27, pp. 241–44) is the following entry: " Mr. Hewson's descriptions were greatly illustrated by the exhibition of a series of preparations taken from turtles and divers fishes, wherein these vessels were injected and shown to the naked eye in their rise, progress, communications and insertions, to the great satisfaction of the Society. Thanks were returned to Dr. Hunter and Mr. Hewson for these very ingenious communications."

On 8th March 1770, Hewson was elected a Fellow of the Royal Society, and on 22nd November of the same year, Sir Godfrey Copley's Gold Medal was awarded to him " for his papers on the lymphatic system in birds, amphibious animals and fishes ". He was then 31 years old. William Hunter, 20 years his senior, had gained the honour of Fellowship of the Royal Society only three years previously; and he never received the award of the Copley Medal!

The dispute with Munro was mainly concerned with the lacteal vessels of birds. John Hunter also had made observations on the absorbent vessels in birds and reptiles some years previously and, though his findings were not then published, the following passage reveals that Hewson was acquainted with them:

" In the beginning of the year 1764–5 I got a crocodile which had been in a ' show ' for several years in London before it died. It was at the time of its death perhaps the largest ever seen in this country, having grown to my knowledge above three feet in length and was above five feet long when it died. I sent to Mr. Hewson and before I opened it, I read over to him my former descriptions of the dissections of this animal, relative to the ' absorbing system ', both of some of the larger lymphatics and of the lacteals, with a view to see how far these descriptions would agree with the appearances in the animal now before us, and on comparing them they exactly corresponded. This was the crocodile from which Mr. Hewson took his observations of the colour of the chyle. The intention of my showing this crocodile, and also reading my former dissections to Mr. Hewson was, that he might see that I had a tolerable description of this system in the Amphibia; because I found him busy in the pursuit of this system in various animals and hinting himself to be the discoverer of it even in birds, and to convince him that this description must have been written some considerable time before, in all probability before my going abroad. As crocodiles are seldom to be had in this country, I could hardly have dissected two crocodiles besides this, between May 1763 (the time I returned from Portugal), or the autumn of 1763, when the turtle was dissected, and the beginning of the winter 1764–5. Mr. Hewson at the time appeared satisfied, or at least made no remarks." (*Essays and Observations*, edited by Richard Owen, 1861, Vol. III, p. 334.)

Soon after his marriage, Hewson left Windmill Street and took a house in Broad Street nearby; but he still shared the teaching and the profits of the school and the partnership continued for another two years. Soon after the birth of Hewson's son on 26th April 1771, however, Hunter announced that he proposed to break the partnership since he felt that now Hewson had a family, and was no longer living under his roof, he would not attend to his duties in the way an assistant should do. Hewson was surprised and chagrined, the more so when, on the termination of the agreement in the spring of 1772, he found that he was refused permission to take from the museum in Windmill Street the preparations that he himself had made and which he considered to be his own property. Benjamin Franklin was called upon to act as mediator in the dispute and among his papers now in the possession of the American Philosophical Society is a list of William Hunter's complaints about Hewson's conduct. Among these are the two following:

" That he had employ'd a Man to pick Bones out of the Tubs and fit up a Skeleton for him, without Leave of Dr. H. which ought not to have been done till the Lectures were over.

" Mr. H.'s behaviour to Dr. H. was extremely rude, and that he had said, he was a Fool to expect that Dr. H. would act like a Gentleman."

Franklin was able to effect a partial reconciliation and some, though not all, of Hewson's preparations were handed over.

This matter of specimens was important to him for he now planned to open his own school of anatomy. For this purpose he took a house in

Craven Street, No. 27, and had it reconstructed to include a lecture theatre and museum. He set to work at once to prepare a series of specimens to illustrate his teaching, many of them similar to those he had seen in or made for William Hunter's Museum. Among the Hunterian manuscripts preserved in the Library of the University of Glasgow is one giving descriptions of about 60 injected preparations. Unfortunately, the specimens cannot now be traced, but they must have formed a fine, unique collection, for some of them are of whole bodies, many with a two-colour injection. The following is the description of one of these:

" The head and trunk of a lad about 16 injected red by the arteries and yellow by the veins, the heart also injected and in situ. The trunks of the great veins and the whole vena portarum are the objects aimed at. Cava superior, the two subclavians and two jugulars are well seen, so is cava inferior but vena portarum is particularly well injected and dissected—a beautiful preparation."

That Hewson knew of the technique of preparing such specimens is obvious from the fact that he prepared several for his own museum. The following is the description of one of these:

" The trunk of a young subject, in which the heart and lungs are injected; as are also the vena cava and aorta, with their branches in the abdomen; the mesenteric vessels are filled, the arteries with red, the vena portarum and its branches with green."

On 30th September 1772 he gave an inaugural lecture in his new theatre, to which he invited the leading London men of science, the subject being the Spleen and Thymus. His first course of lectures was so popular that more than half the pupils from Windmill Street were attracted to Craven Street. At the end of 18 months of intense activity, his practice in midwifery and surgery had increased to such a degree and his anatomical lectures were so successful that there seemed no doubt that his future prosperity and distinction were assured. On 18th April 1774, however, he was seized with a fever caused by a wound received during dissection, and he died on 1st May, his funeral taking place five days later at St. Martin-in-the-Fields. A second son had been born on 9th April 1773; a third child, a daughter, was born after his death. Benjamin Franklin wrote of him: " He was an excellent young man, ingenious, industrious, useful and beloved by all that knew him. He was just established in a profitable, a growing business, with the best prospects of bringing up his young family advantageously. They were a happy couple. All their schemes of life are now overthrown."

At the time of his death, Hewson had been engaged upon the preparation of the third volume of his *Experimental Enquiries*. The first of these, into the Properties of the Blood, had appeared in 1772, and the second, a Description of the Lymphatic System in the Human Subject and in other Animals, was published in 1774. The first chapter of the third volume, a Description of the Red Particles of the Blood in the Human Subject, had already been published in the *Philosophical Transactions* of the Royal Society in 1773 (Vol. 63), and on p. 305 Hewson describes the type

of microscope that he used: " It was this instrument supported on a scroll, as delineated by Mr. Baker (*Microscope Made Easy*, Plate II, Chap. 3), that has been used in these experiments ".

The Henry Baker alluded to above was a son-in-law of Daniel Defoe, whose youngest daughter, Sophia, he married on 30th April 1729. On the recommendation of Sir Hans Sloane, Dr. Cromwell Mortimer and Mr. Martin Folkes, he was elected a Fellow of the Royal Society on 12th March 1740–1, and his certificate states him to be " a person well versed in mathematicks and natural knowledge, particularly eminent for

Fig. 3. Microscope used by Hewson in his experiments.

his great skill and happy success in teaching persons born deaf, and consequently, dumb to speak, author of a very beautiful poem called the ' Universe ', with many curious notes regarding natural history, and one who hath communicated some useful papers to the Royal Society ". It was Baker who examined and reported upon the Leeuwenhoek microscopes and specimens presented to the Society in the year 1723 (*Phil. Trans.* 1740, pp. 503–519)*; and in 1744 he was awarded the Copley Medal in recognition of the value of his work on the " Crystallisation or

* There were 26 of these, but all trace of them has now been lost. Recently copies of the Leeuwenhoek microscope have been made by John Syrrett in the Anatomy Department and placed in the Museum.

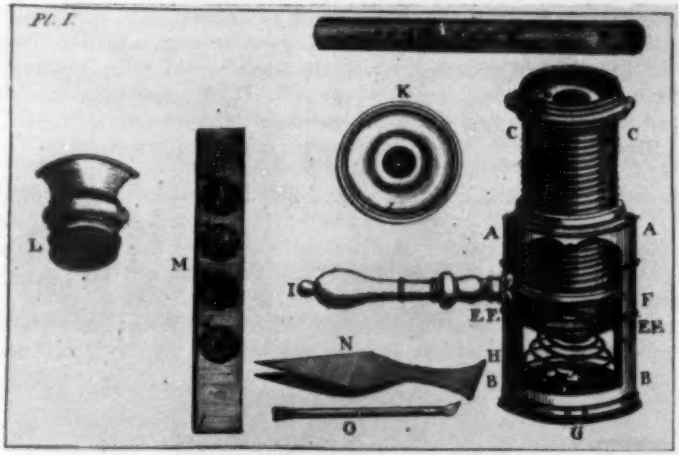


Fig. 4. The screw-barrel " pocket-microscope " designed by James Wilson.

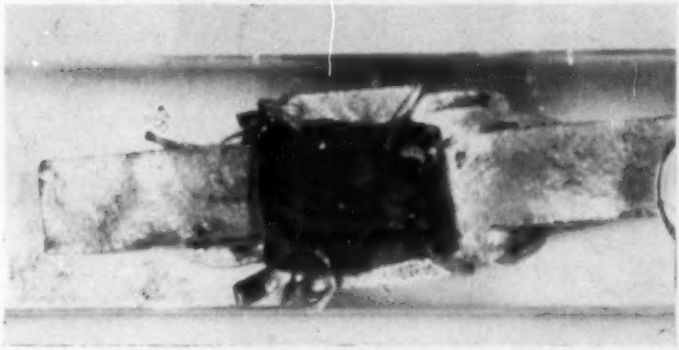


Fig. 5. The tissue is clipped to a strip of metal.

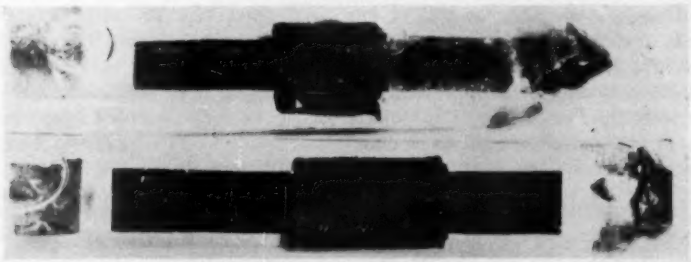


Fig. 6. The reverse of the specimen, showing the description scratched on the back of the metal strip.

Configuration of the minute particles of Saline Bodies ". Perhaps the best remembered of his numerous publications, however, is his *Microscope Made Easy*, the first edition of which appeared in 1742. The microscope mentioned by Hewson, the Scroll type (Fig. 3), so called because of the design of the stand, was probably one made by John Cuff (1708–1772), " at the sign of the Reflecting Microscope, exactly against Sergeant's Inn Gate, Fleet Street, London ". Baker was a friend and patron of Cuff, who undertook the sale of the second and subsequent editions of the *Microscope Made Easy*. The working part of the instrument, however, was the Wilson screw-barrel microscope which was fixed to the stand (Fig. 4). This James Wilson (1665–1730) first described his " pocket-microscope " in 1702 (*Phil. Trans.* No. 281, p. 1241). Among the accessories he mentions are glass tubes " for seeing the circulation of the Blood at the Extremities of the Arteries and Veins, in the transparent parts

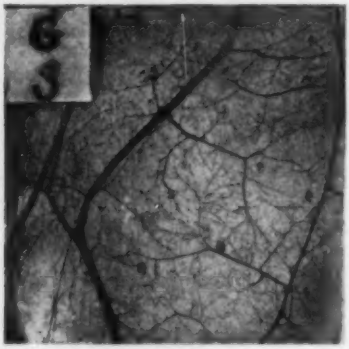


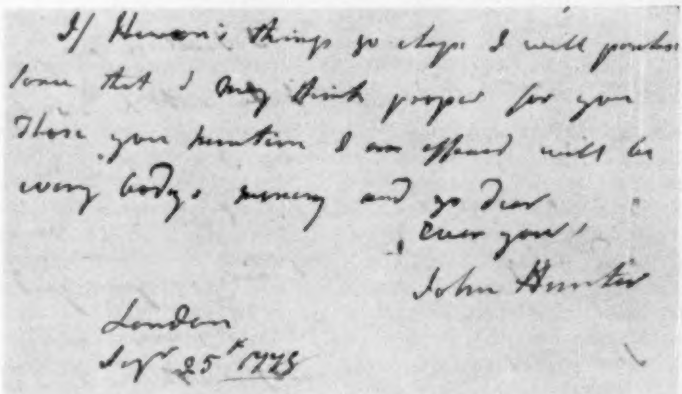
Fig. 7. Tissue spread upon a square of glass.

of Fishes, Eels, etc.", and he goes on to say: " If you would see the Blood Circulate in a Frog's Foot, choose such a Frog as will just go into your Tube, then, with a little Stick, etc., expand the Hinder foot of the Frog, and apply it close to the side of the Tube, observing that no part of the Frog hinders the Light coming on its Foot, and when you have it at the just distance . . . you will see the rapid Motion of the Blood, in its vessels, which are very Numerous in the Transparent thin Membrane that's between the Frog's Toes . . . " and he also gives the advice: " In the viewing of Objects, one ought to be careful not to hinder the light from falling upon Them, by the Hat, Perruke, or any other thing."

It is possible that Hewson adapted this idea to the preparation of his " wet " slides. So far as can be ascertained, these specimens in tubes for viewing under the microscope have not previously been described. The tissue is clipped to a narrow piece of metal (Fig. 5), on the back of which is

scratched the description (Fig. 6). This has then been inserted into a narrow flat glass tube containing, originally, spirit. In the other preparations, the tissue is spread upon squares of glass. Many of these have dried and deteriorated so as to be no longer recognizable, but Figure 7 shows one of the better ones, a portion of chorion with the vessels injected.

On his death-bed, Hewson is said to have made the request that Magnus Falconar should be his successor in the Craven Street School. This young man, son of Magnus Falconar of Portsmouth and Elizabeth Eilway of Cheltenham, who were married at St. Mary-le-Strand on 19th April 1750, was born at Cheltenham in November 1754. He was one of John Hunter's pupils at St. George's Hospital in 1771, and gained the Diploma of the Surgeons' Company on 7th July 1774. So, although he


If Hewson's things go cheap I will purchase some that I may think proper for you. Those you mention I am afraid will be every body's money and go dear.

Ever yours,
John Hunter

London
Sepr 25th 1775

Fig. 8. The last paragraph of a letter written by John Hunter to Edward Jenner.

was but 20 years old, he continued the teaching, assumed the care of the museum and added to its contents, and also edited and completed the third volume of Hewson's *Experimental Enquiries*. In the Preface to the work, Falconar writes: "As far as I can recollect, I have recited the experiments in the order they were made by Mr. Hewson; but lest I err, or not represent facts in their true state, I have repeated all the experiments frequently since his death and have written them circumstantially as they appeared to me." On 7th September 1774, Falconar was married in the church of St. Martin-in-the Fields to William Hewson's sister Dorothy. He was a man of outstanding ability and a very good speaker; during the next four years he made good use of the bequest that had been made to him and amply justified Hewson's confidence in his merit. On 24th March 1778, he died of phthisis at Hot Wells, Bristol, where he had gone

in the hope of a cure. On Benjamin Franklin's advice, Mrs. Hewson and the three small children had settled in America, where their descendants still live.

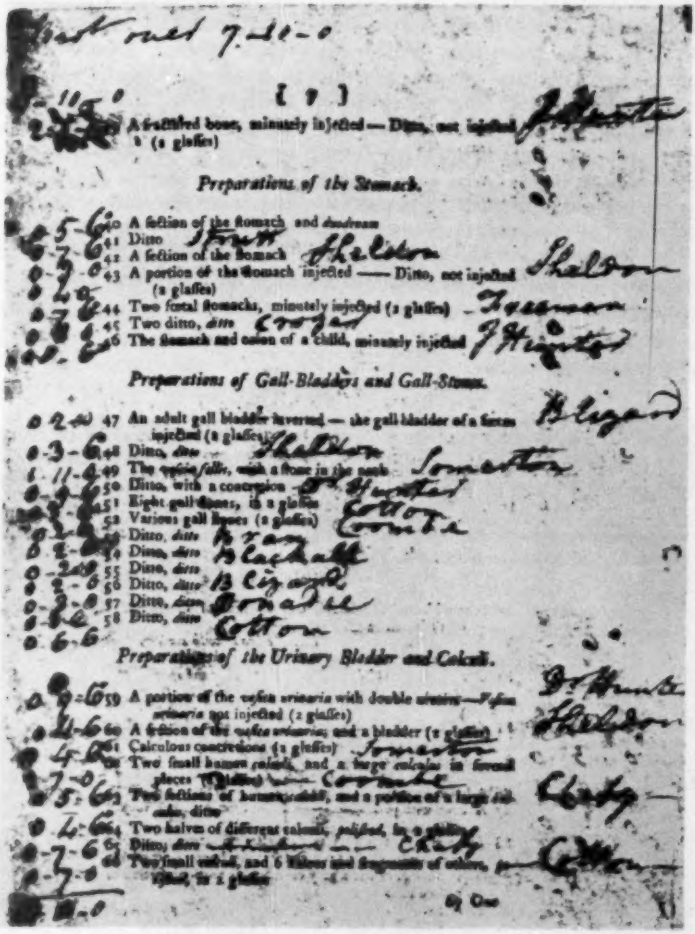
On 30th August 1778—that is, four years after William Hewson's death—John Hunter wrote to Edward Jenner as follows: " I hope this winter to be able to get you some preparations of the eye and lymphatics, but Hewson's preparations are to be sold this month; now perhaps for four or five pounds some preparations may be picked up. If you have no objection to throw away so much money, let me know, and what subjects you would like best. . . ." This letter is quoted in Stephen Paget's biography of John Hunter, published in 1897; but he does not state where the original was at that time and it has not been traced since. Jenner's reply has not survived either, but Hunter wrote to him again on 25th September, and at the end of the letter mentions this subject again: " If Hewson's things go cheap I will purchase some that I may think proper for you; those you mention I am afraid will be everybody's money and go dear." The original of this letter is in the College collection (Fig. 8).

Search in library catalogues and books of reference produced no evidence of a sale of Hewson's museum in this or any other year; but in trying to add to the somewhat meagre details of Magnus Falconar's brief career, the sale catalogue of the *Museum Falconarium* was found in the College Library. This related to the disposal of " The Entire and Capital Museum of Anatomical Preparations and other subjects of Natural History, a great variety of Chirurgical, Anatomical and Philosophical Instruments; Medicaments, Cabinets, Preparation-glasses and other Effects of the late Mr. Magnus Falconar, Surgeon and Professor of Anatomy, deceased." On the first page, immediately under a drawing of a skull and crossbones, the following information is given:

" It is well known that the late ingenious Mr. Hewson prepared and collected a great Number of Anatomical Articles to which his Successor Mr. Falconar added every thing curious, useful or necessary that came in his Way. By the joint labour and ingenuity of these two young Anatomists, the Museum, now offered to Public Sale, was formed, enlarged and extended to its present state.

" It consists of upwards of a thousand Articles in Anatomy, Zootomy, and Natural History; besides which it contains about three Hundred choice Preparations adapted to the Microscope, so ingeniously contrived, that, with little Trouble, they may be viewed to the greatest Advantage; and so effectually preserved, that they cannot easily lose of their Appearance, the wet ones being sealed hermetically. . . . Except a small descriptive Catalogue of the great part of the Microscopical Objects by Mr. Hewson, we could find none other: We therefore confess ourselves at a Loss to determine what some of the Preparations really are; yet we doubt not but they may be easily ascertained upon a closer Examination than we could give them."

The sale took place on the 10 evenings from 12th to 22nd October 1778 (Sundays excepted), commencing at 5 o'clock. On the last evening, item 87 was " An elegant mahogany inlaid cabinet with 16 drawers, containing about 300 microscopical objects, from curious anatomical preparations, spread upon glasses, and enclosed in glass tubes hermetically sealed."



Preparations of the Stomach.

Preparations of Gall-Bladders and Gall-Stones.

Preparations of the Urinary Bladder and Calculi.

Reproduced by kind permission of the Librarian, the British Museum (Natural History Cromwell Road, London, S.W.7.

Fig. 9. A page from the Sale Catalogue of Magnus Falconar's Museum.

Quite by accident, another copy of this sale catalogue was found, in the Library of the Natural History Museum in South Kensington; and this was particularly interesting and valuable since the names of the purchasers and the prices they paid are entered almost throughout the duration of the sale. We thus learn that William and John Hunter, John Sheldon, Henry Cline, William Blizard, Martin van Butchell, William Lynn—in fact, all the eminent and many of the lesser known anatomists and surgeons of the time—attended (Fig. 9). Unfortunately, the person who so meticulously entered all these details during the first nine days grew weary or was unable to be present on the last day when the cabinet containing the microscopical preparations was put up for sale. There is no doubt, however, that these are the ones recorded by Professor Quekett, 103 of which remain and have a place of honour within the Hunterian Collection. It may well be that Hunter shared the contents of the cabinet with Jenner, or that some were discarded without record.

COLLEGE PUBLICATIONS

READERS ARE REMINDED that the following publications issued or sponsored by the College may be obtained from the Editorial Secretary, Royal College of Surgeons of England, Lincoln's Inn Fields, London, W.C.2.

A Catalogue of the Portraits and other Paintings, Drawings and Sculpture in the College. By William Le Fanu, Librarian. 184 pages with 4 coloured and 52 black and white plates. £1 10s. 0d. (postage 1s. 9d.).

The History of the College. By Sir Zachary Cope, F.R.C.S. 376 pages, fully illustrated. £3 3s. 0d. (plus 2s. postage).

Lives of the Fellows, 1930–1951. By the late Sir D'Arcy Power, K.B.E., F.R.C.S., Honorary Librarian, and continued by W. R. Le Fanu, M.A., Librarian. A single volume, bound in blue cloth, of 889 pages, containing the Lives of all Fellows known to have died between 1930 and 1951. £2 2s. 0d. post free.

A Record of the Years from 1901 *to* 1950. Edited by Sir Ernest Finch, M.D., M.S., F.R.C.S. A slim volume, illustrated, containing a brief history of the College between the centenary and the 150th anniversary of the foundation with lives of all the Presidents since 1900, written by special contributors from their personal knowledge. In red cloth 9s. post free or red paper covers 5s. 6d. post free.

A Guide to the Hunterian Museum (*Physiological Series*). This gives a brief account of the physiological section of John Hunter's museum, the scope, design and historical value of which is unique. 48 pp. 1s.

A Descriptive and Historical Catalogue of the Darwin Memorial at Down House. Charles Darwin and his family lived at Down House, near Orpington, Kent, for forty-two years and it was here that most of his scientific investigations were made, including his work on the Origin of Species, published in 1859. 33 pp. 1s.

The Portraiture of William Harvey. The Thomas Vicary Lecture for 1948 by Sir Geoffrey Keynes, M.A., M.D., F.R.C.S. With a descriptive catalogue and 33 reproductions of the portraits. £1 5s. 0d.

**William Clift.* By Jessie Dobson, B.A., M.Sc., Anatomy Curator. A biography, fully illustrated, of the first Conservator of the Museum at the College. Published by William Heinemann Medical Books Ltd. Bound in blue cloth; 144 pages with frontispiece portrait and 31 plates. 8s. 6d. post free.

The present position of cardiac surgery. The Bradshaw Lecture for 1957 by Sir Russell Brock, M.S., F.R.C.S. Blue cloth binding, 6s. 0d. post free.

*A separate cheque for this publication would be appreciated.

IMPROVEMENTS AND ADDITIONS TO *ANATOMICAL TECHNIQUES*

I. MOUNTING OF SPECIMENS

by

D. H. Tompsett, B.Sc., Ph.D., and S. C. Bartlett, A.I.S.T.

from the Anatomy Department, Royal College of Surgeons of England

The purpose of this series of articles is to make available various improvements and additions to the methods used in the preparation and mounting of specimens in the Anatomical Museum, since the publication of *Anatomical Techniques* (Tompsett, 1956).

Construction of Perspex containers

When rectangular Perspex boxes are being constructed, the principal problem is to hold the first three sides in their correct position while they are being cemented together. Once these have been stuck together a self-supporting structure is obtained, to which the remaining sides can be cemented without special difficulty.

The method recommended in *Anatomical Techniques* (Fig. 15, p. 53) was tedious, especially if a number of Perspex boxes were under construction simultaneously. A simpler method has been devised. It consists of a number of little home-made adjustable clamps, constructed by screwing two pieces of angle brass to a rectangular block of wood. A steel bolt passes through a thread cut into one arm of each angle piece. The first four pieces of Perspex from which a box is to be constructed are cut and assembled as shown in Figure 1, by means of four of these clamps. The clearance between the wooden block and brass angle piece is sufficient to accommodate the thickest Perspex to be used. The Perspex is pressed

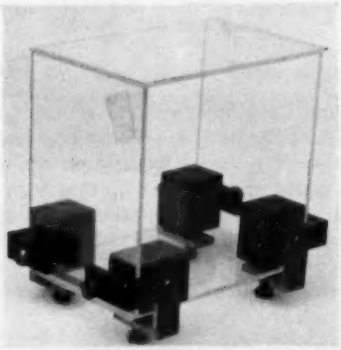


Fig. 1. Home-made clamps for holding pieces of Perspex in correct position while they are being cemented together, during the construction of Perspex boxes.

firmly against the wooden blocks by tightening the bolts with the fingers. The top piece of Perspex which, in the figure, is just resting in position, is cemented with Tensol No. 3 cement in the usual way. Provided sufficient clamps are available, a number of Perspex boxes can be constructed simultaneously by this method. Another advantage is that the two sheets of Perspex held vertically in Figure 1 are cemented to the top piece in such a position that they exactly fit the bottom piece of Perspex, to which they are cemented later. In the case of Perspex boxes too small to be held together with these clamps, three pieces of Perspex can be held in position by Sellotape while the fourth is being cemented in position.

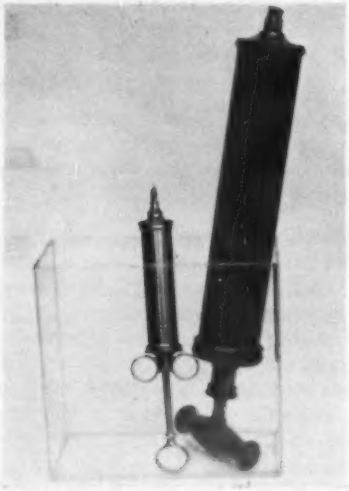


Fig. 2. 500 ml. veterinary syringe for storing Tensol No. 3 cement, and the 50 ml. extrusion syringe.

Storage of Tensol No. 3 cement

Tensol No. 3 cement for joining Perspex sheets is made up by mixing thirty parts by weight of the powder with seventy parts by weight of the liquid. Owing to its high viscosity this cement can only be extruded by using a syringe with a slender barrel, which thus permits a high extrusion pressure. The capacity of a syringe suitable for this work (*Anatomical Techniques*, Fig. 14, p. 52) is only 50 ml. It would be both tedious and wasteful to make up only enough cement to fill the syringe once, as there would be as much cement sticking to the beaker in which it was prepared as could be poured into the syringe.

500 ml. is a convenient quantity of Tensol No. 3 cement to prepare at a time. Previously it was recommended that, after the extrusion syringe

had been filled, the surplus should be stored until required in collapsible lead tubes, from which it can be easily transferred to the syringe.

This method of storage is not entirely satisfactory. Apart from the cost of the tubes and the labour of filling them and sealing the ends, it was found that the lead hastened the polymerization of the cement so that, even if stored in the refrigerator, the cement sometimes became unusable after a week.

A more convenient method of storing the cement is to pour it immediately after it is made up, when it is still hot and relatively fluid, into a 500 ml. brass veterinary syringe, the delivery end of which is closed by a cork. Figure 2 shows a 500 ml. storage syringe beside the 50 ml. extrusion

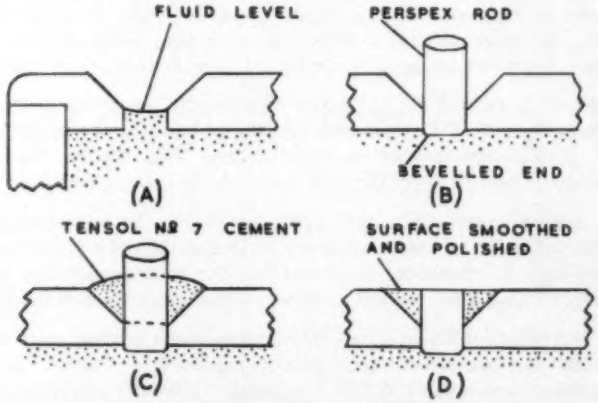


Fig. 3. Method of sealing Perspex boxes containing wet specimens. Note fluid level in (A). This avoids a bubble of air being trapped inside when the Perspex rod is inserted into the hole.

syringe. Both syringes are placed upside down when not in use so that any air bubbles trapped in the cement rise to the top and can be expelled.

Refilling of the small syringe from the large one is a simple and clean operation. If stored in a cool place the cement remains usable in the large syringe for at least two weeks. If stored in the refrigerator, the life of the cement can be prolonged further. Before refilling, the veterinary syringe is filled with chloroform and left overnight, to wash out the old cement.

Sealing of Perspex containers

The method of sealing Perspex containers by means of a Perspex rod dipped in Tensol No. 6 cement (*Anatomical Techniques*, p. 62) has not proved entirely satisfactory. In a few cases the seal has been slightly

defective. Although the defect is rarely large enough to produce visible leaks, it is sufficient to allow evaporation of the mounting fluid so that, after a number of years, an air bubble of increasing size appears in the container.

The advent of Tensol No. 7 cement makes possible a simple and at the same time dependable method of sealing containers filled with fluid. This is illustrated in Figure 3.

The filling holes in the Perspex container are made with a $\frac{3}{16}$-inch drill. The top of each hole is countersunk to half the thickness of the Perspex. A short length of $\frac{3}{16}$-inch Perspex rod is tapped into the hole until it is flush with the undersurface of the top of the container. Insertion of the rod is facilitated if its end is slightly bevelled. The cavity around the rod is cleaned by means of a sable brush dipped in spirit, to ensure that no glycerine or other substance from the mounting fluid adheres to the Perspex. Such impurities, if not removed, might cause a leak later.

Immediately before the cement is applied the concavity surrounding the projecting end of Perspex and the adjacent rod are carefully painted with a sable brush dipped in chloroform. This softens the surface sufficiently to ensure good bonding between the cement and the Perspex.

The cement consists of a thin syrup which can be poured easily. It is prepared for use by incorporating a small quantity of a liquid hardener supplied with it. Sufficient is poured into the countersunk hole to fill it completely with a slight mound of cement above the surface of the Perspex.

The cement solidifies in about 30 minutes under normal working conditions, but in a cold room it may take up to an hour. It is left for twenty-four hours to ensure that it is fully hardened. Then the projecting Perspex rod is cut off with a hot knife (see *Anatomical Techniques*, p. 62), and the mound of Tensol cement smoothed to the level of the surrounding surface with a file or sandpaper. Finally the surface is polished on the buffing wheel.

Mounting resin casts

The original method (*Anatomical Techniques*, pp. 122, 124 and Fig. 30) consisted of cementing a length of 2-mm. piano wire with resin cement into a hole previously drilled into the cast. The piano wire was then slid into an upright length of brass tube and fixed securely. As steel cannot be soldered the piano wire was fixed by cutting a thread in its upper end before it was fixed to the cast. Two brass nuts were screwed hard down to the end of the thread. The rod could now be fixed to the brass tube by soldering the nuts to it.

This provides a secure joint between the rod and the brass tube, provided that the soldering was well done. In practice the risk of damage to

the resin by heat, applied during soldering, handicapped the worker; and in spite of precautions the resin cement was sometimes damaged by heat.

These drawbacks have been overcome by completing the whole mounting unit before the rod is cemented into the resin cast. In addition the work has been simplified by using silver steel rod instead of piano wire, which is extremely hard and consequently difficult to work with. Figure 4 shows a diagram of a typical mounting unit. Minor variations are made according to the nature of the resin cast. After the thread has been cut in one end of the silver steel rod, two brass nuts are screwed hard down to

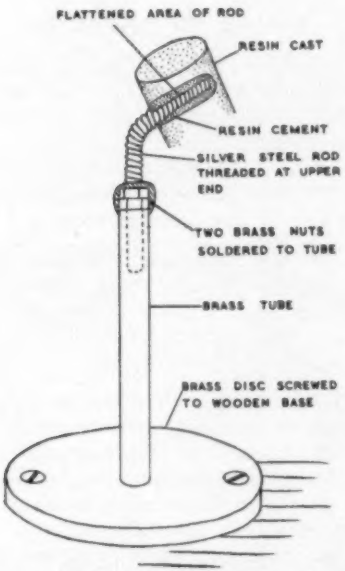


Fig. 4. A typical mounting unit. Size of materials used in construction depends on weight of resin cast.

the end of the thread. The threaded end is then bent as required. One side of the thread is filed flat to ensure that, if the rod becomes slightly loose in the resin, the cast cannot come unscrewed. The rod is then slid into the copper tube as far as it will go and the brass nuts soldered to the top of the tube. The base of the tube is passed through a hole drilled through the centre of a disc of fairly thick brass and soldered in position.

Some difficulty may be encountered in drilling the hole in the resin cast at just the right angle so that the cast is held in the correct position. Within reasonable limits the silver steel rod can be bent, without unduly weakening

it, to compensate for this, but, if necessary, the hole in the cast can be greatly enlarged to adjust the position of the specimen. If an unusually large hole is drilled, this can be filled with resin when the rod is cemented in position. If the resin is inclined to flow out of the hole before it sets, the resin can be thickened by the addition of some Vinylite VYHH powdered resin (Tompsett, 1959).

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A VISIT TO PAKISTAN

ON 16TH, 17TH AND 18TH NOVEMBER 1960, the King Edward Medical College, Lahore, celebrated its Centenary. The delegates included no less than three members of Council, Mr. R. H. O. B. Robinson, Professor Ian Aird and Professor Charles Wells, and a member of the senior teaching staff, Professor R. J. Last. Sir Alexander Biggam, Professor Malcolm Black and Dr. Donald Hunter completed the United Kingdom party, with Mrs. Robinson and Mrs. Hunter accompanying their husbands.

On the morning of 16th November, an enthusiastic welcome was extended to the President of Pakistan, Field Marshal Mohammed Ayub Khan, who delivered a stimulating and laudatory inaugural address. This was followed by formal messages of greeting and congratulation from the Royal College of Surgeons and other bodies.

A delightful interlude, characteristic of the whole meeting, was coffee in the gracious gardens of the College, where old friends met again and talked together as they visited the pharmaceutical exhibition and the College generally. After lunch, scientific papers were read by the delegates to a large and attentive audience of students and graduates. Afternoon visits to centres of interest were followed by a reception offered by General Burki, Minister of Health, and a dinner and entertainment at the Gymkhana Club.

Thursday morning was devoted to scientific papers presented, again to a delighted and crowded audience, by members of the teaching staff of the King Edward Medical College, who afterwards introduced the party to their individual departments. Lunch under the colourful " shamiana ", on Persian rugs, led by a short step to another part of the grounds, where the students' gymkhana, umpired by Professor Last, brought their week of competitive sports to a riotous conclusion. The prizes were then presented by His Excellency Jehan Shah Saleh, Minister of Health of Iran.

The evening was marked by a reception at Government House given by the Governor of West Pakistan, His Excellency Malik Amir Mohammed Khan, a banquet under " shamianas " by Lt.-Col. B. H.

Syed, Director of Health Services, West Pakistan, and later by the students' excellent dramatic presentation, in English for the first time and for the benefit of the visitors, of Pirandello's " The Rules of the Game ".

Friday morning saw a special Convocation of the University of the Punjab, presided over by the Chancellor, the Governor of West Pakistan, who invested with the Honorary Degree of LL.D. Sir Alexander Drummond, Sir Alexander Biggam, General Burki and Professor Wells. Mohammed Arif Ilahi accepted a similar honour awarded posthumously to his father, the late Lt.-Col. Ilahi Bakhsh, a devoted ex-Principal of the College.

An official visit to the Mayo Hospital was followed by a number of private luncheon parties. Later in the day the visitors made a recording for broadcasting, were received at the United Kingdom High Commission in Lahore by Mr. Crawley, dined as the guests of the King Edward Medical College and rounded off three memorable days at a riotously amusing variety show given by the students to a crowded audience.

The lasting impressions are of a College abounding in enthusiasm and optimism; of a vigorous group of teachers and an avid group of students embarking together with confidence, as was picturesquely suggested by Sir Alexander Biggam in his address to the University Convocation, on their second century. No formal thanks can express the gratitude of the visitors for the kindness and hospitality extended to them on every side. They would, however, like especially to mention the most efficient Secretary of the Centenary Committee, Mr. Ismet Anwar, F.R.C.S., and their hosts and sponsors, namely the Government of Pakistan and the King Edward Medical College itself, the Royal College of Surgeons of England and the British Council.

On the completion of the celebrations in Lahore, a visit as guests of the Government of Pakistan was made to the University of Peshawar, the Khyber Medical College, and the Khyber Pass. Thence the party went to the Nishtar College, Multan, the Liaquat College, Hyderabad, and so back to Karachi, visiting the Dow Medical College and the Civil and Jinnah Central hospitals. All these visits were rewarding and heartwarming experiences.

C. A. W., R. J. L.

ANATOMICAL MUSEUM

THE SPECIAL DISPLAY for the month of March consists of information relating to John Ellis the Naturalist (1705?–1776).

IMPERIAL CANCER RESEARCH FUND

THE NEW LABORATORIES IN LINCOLN'S INN FIELDS

THE NEW BUILDING has at last shown itself above ground, but so far only in skeleton, which like all the rest of the building will be in reinforced concrete in all its constructional members. It has taken a long time to get to the present stage, but there are a number of reasons for this apparent lack of speed in building.

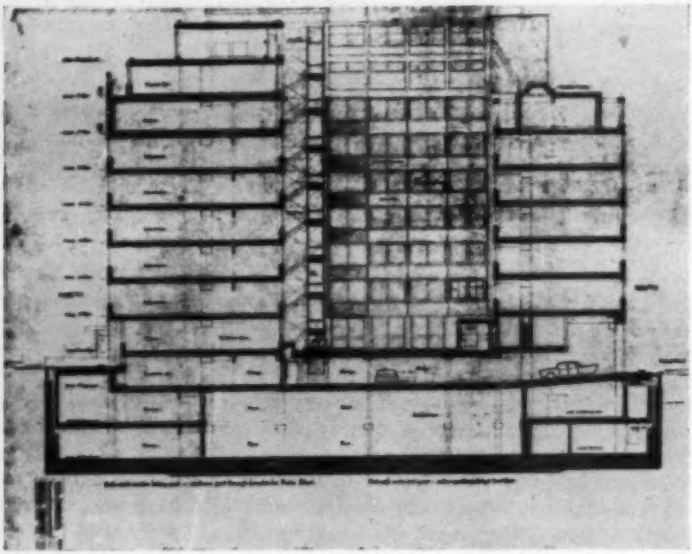

Fig. 1. Section illustrating the number of floors.

Firstly, it must be remembered that the site is very restricted, is surrounded by existing buildings, and on the Western side there are the three very old and decrepit buildings, Nos. 47, 48 and 49, Lincoln's Inn Fields.

No. 47 has caused considerable trouble and, both inside and out, shoring and strutting up of floors and walls has had to be done in order to render the house reasonably safe for use and to allow the new building to be constructed without any undue risk.

Secondly, having regard to the nature of the soil below the new building, a mixture of made-up ground, sand, gravel and a low bed of clay, it was found necessary to go down some 35 feet below ground before a sound foundation was agreed as safe to build on.

Thirdly, and perhaps the most difficult of the many problems that have had to be solved, was just exactly what was to go into the building, and, of course, where the various departments should go. Many exhaustive discussions were necessary before any final decisions were made available, and it was not until August last year that near finality was reached.

During the detailed discussions, broad principles settling the shape and size of the building were arrived at, and the method of construction was generally agreed. The plans were submitted to the London County Council Town Planning Authority, the Westminster City Authority, together with the elevational design for all fronts, and these were approved by both bodies.

It will be seen by the section illustrated (Fig. 1) that there are three basements below ground, a ground floor, and seven floors above, and the

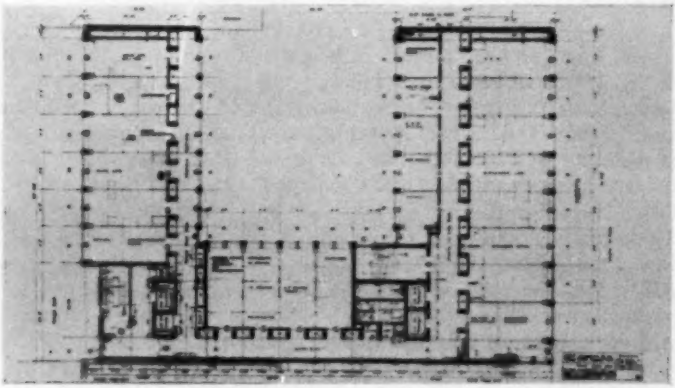

Fig. 2. Plan showing the shape of the building at third floor level.

plan also illustrated shows the general shape of the building at third-floor level (Fig. 2).

In a short description such as this it will not be possible to describe the building in detail, but, as a rough guide to the layout, it would be not unreasonable to say that the planning has been determined by the shape of all the main laboratories, approximately each of them being 24 feet deep and 11 feet wide.

So far as it has been possible, everything has been standardized, especially the actual layout of the laboratories, making changes in the fitting-up in accordance with the specific requirements of the Professors.

To enable the maximum flexibility to be obtained, all the dividing partitions have been designed on a standard dimension, and will be

constructed of materials which would allow the partitions to be " demounted " and put elsewhere.

All the special bench and other fittings again have, so far as possible, been made of standard dimensions and design.

A great deal of thought has been given to the engineering side, which in the nature of things will be very complicated, and therefore very costly, especially in view of the fact that full air conditioning and cooling has been called for. Advantage has been taken of the three basements and the bulk of the heavy plant will go in at the lowest level, and much of it will spread to a gallery at what is called " the second basement ". Above this at first basement there will be in the centre of the site a garage entered from Portugal Street on the South side of the site.

In order to satisfy the Town Planning Authorities, the elevation facing Portugal Street had to be lower in height and on top to have a set back roughly as was required when building this front of the Royal College. This has meant a loss of floor space as compared with the North elevation facing Lincoln's Inn Fields. Advantage was taken of this increased height, and therefore an additional floor, the seventh, was planned for, accommodation being provided to give one large flat and one small one.

From the plan and cross section illustrated, some idea of the size and shape of the building can be gained, but it will not be possible to appreciate the scale until the roof is on, and even then it will want a tour of the building to realize what the inside will be like, and so get some indication of the enormous amount of care and thought which will have been poured into this very complicated building.

It is hoped that further reports will be prepared as the building develops in detail.

A. W. H.

FACULTY OF DENTAL SURGERY

THE FACULTY OF DENTAL SURGERY'S third Scientific Meeting will be held at the College on Saturday, 3rd June 1961. The subject chosen for the Meeting is " Temporomandibular Joint Problems and their Treatment ". There will be no admission fee for this meeting, and it will be open to all dental and medical practitioners and dental and medical students. The programme is now being arranged and full details will be available by the beginning of April.

GRANT OF DIPLOMAS TO FELLOWS IN THE FACULTY OF ANAESTHETISTS

AT THE FINAL EXAMINATION for the Fellowship in the Faculty of Anaesthetists held in January, 47 candidates out of 143 were successful.

At the meeting of Council on 9th February, Diplomas of Fellowship in the Faculty of Anaesthetists were granted to the following:

YOUNGMAN, Patrick Michael Ellis (*University College*).
SHELLEY, Frederick Charles (*Guy's*).
DENNISON, Peter Hendley (*St. Thomas's*).
NAINBY-LUXMORE, Richard Chave (*St. Bartholomew's*).
BRINE, Peter (*King's College*).
SCOTT, Betty Victoria (*Birmingham*).
IRVINE, Ruth Robson (*Glasgow*).
CARVEL, Mercedes Daisy (*Edinburgh*).
ARCHER, Charles John Trevail (*Manchester*).
HEGARTY, William John (*Cork*).
BARKER, John (*Glasgow*).
LOVE, William Jeffrey (*Belfast*).
BURNS, Margaret Elizabeth (*Birmingham*).
McLAREN, Colin Alban Bryant (*Birmingham*).
WEINREICH, Avron Ivan (*Cape Town*).
BREED, Joan Hutley (*Westminster*).
BUCK, Mavis (*St. Thomas's*).
DAVIES, John Alan Hugh (*Birmingham*).
DUTTA, Hemanta Kumar (*Gauhati*).
McQUADE, Patrick John (*Westminster*).
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In order to satisfy the Town Planning Authorities, the elevation facing Portugal Street had to be lower in height and on top to have a set back roughly as was required when building this front of the Royal College. This has meant a loss of floor space as compared with the North elevation facing Lincoln's Inn Fields. Advantage was taken of this increased height, and therefore an additional floor, the seventh, was planned for, accommodation being provided to give one large flat and one small one.

From the plan and cross section illustrated, some idea of the size and shape of the building can be gained, but it will not be possible to appreciate the scale until the roof is on, and even then it will want a tour of the building to realize what the inside will be like, and so get some indication of the enormous amount of care and thought which will have been poured into this very complicated building.

It is hoped that further reports will be prepared as the building develops in detail.

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GRANT OF DIPLOMAS TO FELLOWS IN THE FACULTY OF ANAESTHETISTS

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SCOTT, Betty Victoria (*Birmingham*).
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CARVEL, Mercedes Daisy (*Edinburgh*).
ARCHER, Charles John Trevail (*Manchester*).
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GRANT OF DIPLOMAS

CLEMENT, Anthony John (*St. Thomas's*).
HARGREAVES, Michael Denham (*Leeds*).
HAYES, Martin Edward Broughton (*St. Bartholomew's*).
KNIGHT, Ronald Frank (*Charing Cross*).
MacRAE, William Rennie (*Edinburgh*).

APPOINTMENT OF FELLOWS AND MEMBERS TO CONSULTANT POSTS

F. G. CHRISTENSEN, F.D.S.R.C.S. — Professor of Oral Surgery, University of Baghdad.

The Editor is always glad to receive details of new appointments obtained by Fellows and Members, either through the Hospital Boards or direct.

PROCEEDINGS OF THE COUNCIL IN FEBRUARY

AN ORDINARY MEETING of the Council was held on 9th February 1961, at which the Chair was taken by Sir Stanford Cade, Senior Vice-President, in the absence of the President, who was abroad.

Sir Clement Price Thomas was appointed the Thomas Vicary Lecturer for 1961.

The death of Sir Geoffrey Jefferson, F.R.C.S., F.R.S., was recorded with the deepest regret.

Mr. Hugh Reid and Mr. A. H. M. Siddons were re-elected as members of the Court of Examiners for a further period of three years.

The following were elected to the Fellowship *ad eundem:*

W. J. Dempster, F.R.C.S.Ed., Lecturer in Experimental Surgery at the Postgraduate Medical School of London, and a former Research Worker at the Buckston Browne Farm.

O. D. Morris, M.C., F.R.C.S.Ed., Consultant Surgeon, Ashford Hospital, Middlesex.

Dr. Joseph Volker, Dean of the Dental School, Birmingham, Alabama, U.S.A., was elected to the Fellowship in Dental Surgery.

It was reported that at the January Primary Examination for the Fellowship held in this country there were 275 candidates, of whom 45 were approved, and the Hallett Prize was awarded to W. C. Moffat of the University of Glasgow. At the corresponding examination overseas, four out of ten candidates were successful in Khartoum and eight out of 57 in Colombo.

At the Primary Examination for the F.F.A.R.C.S. held in Colombo, two candidates passed out of ten.

Diplomas of Membership were granted to 136 candidates and the Handcock Prize was awarded to M. H. Devereux of Guy's Hospital Medical School.

Diplomas of Fellowship were granted to R. C. F. Cilento and G. R. James.

Other Diplomas were granted as follows:

Industrial Health (19), *Laryngology and Otology* (1), *Psychological Medicine* (1), *Public Health* (1), *Tropical Medicine and Hygiene* (1).

Privileges were withdrawn from a Fellow in Dental Surgery for failure to pay his annual subscription.

The following hospitals were recognized under paragraph 23 of the Fellowship regulations:

Hospitals	Posts Recognized		
	General (6 months unless otherwise stated)	Casualty (all 6 months)	Unspecified (all 6 months)
Croydon — General Hospital (additional)			Regr. (Orth.)
Croydon — Mayday Hospital (additional)			Regr. (Orth.)
Merthyr—St. Tydfil's Hospital	H.O.		S.H.O. (Orth. and Traumatic)
Kettering — General Hospital	Regr. (12 m.)		
Carshalton — Queen Mary's Hospital for Children (additional)			S.H.O. (Gen.)
Taunton—Taunton and Somerset Hospital (additional)	Regr.	2 J.H.M.Os. (Cas.)	
Southampton—General Hospital (additional)	2nd Regr. (12 m.)		
Nelson — Reedyford Memorial Hospital (additional)	2 S.H.Os.		
Redhill — County Hospital (additional)			Regr. (Orth.) S.H.O. (Orth.)
Brighton—The Royal Sussex County Hospital (additional)		H.O. (Cas. and Gynaec.)	
Salisbury, Southern Rhodesia — Harari Hospital	3 H.Ss.	H.S. (Cas.)	
Galle, Ceylon—General Hospital	4 H.Ss.	R.S.O. (Cas.)	
Jaffna, Ceylon—General Hospital	4 H.Os.		

After the meeting, an Arris and Gale Lecture was delivered by Mr. P. H. Golding-Wood on " Autonomic surgery of the ear, nose and throat ".

DIARY FOR MARCH

Wed.	15	3.00	Annual General Meeting of Faculty of Anaesthetists.
		4.00	Dr. R. P. W. Shackleton—Frederic Hewitt Lecture—In the end is my beginning.
Thurs.	16		Pre-Medical Examination begins.
Fri.	17	5.00	Board of Faculty of Dental Surgery.
Thurs.	23	5.00	Professor W. Bryan Jennett—Hunterian Lecture—Epilepsy after blunt head injury.
Sat.	25		Last day for applications for Annual Examinerships.
Mon.	27		Final Membership Examination begins.
		5.00	Dr. Walter S. Stiles—Edridge-Green Lecture—The directional sensitivity of the retina.
Fri.	31		Good Friday. College closed.

DIARY FOR APRIL

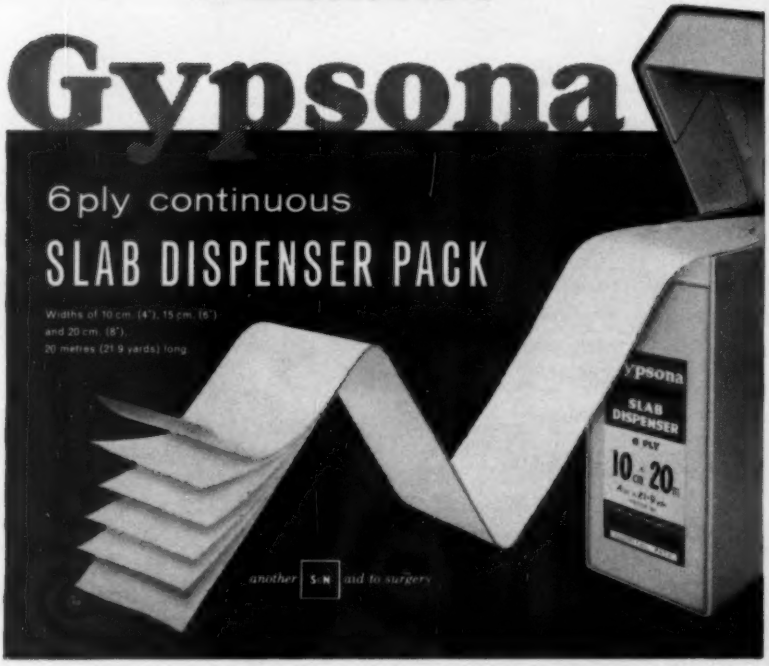
Sat.	1		College closed.
Mon.	3		Easter Monday. College closed.
Tues.	4		Surgery Lectures and Clinical Conferences begin. Date of Council Election announced.
Sat.	8		Course in Clinical Surgery ends.
Mon.	10		Anaesthetic Course begins.
Tues.	11		Last day for nomination of candidates (F.D.S.) for the Board of Faculty of Dental Surgery.
		5.00	Professor J. Keith Ross—Hunterian Lecture—The fate of autogenous tissue grafts in the heart.
Thurs.	13	2.00	Quarterly Council.
		5.00	Professor T. J. Butler—Hunterian Lecture—The effect of gastrectomy on pancreatic function in man.
Tues.	18	4.15	Dr. A. A. Barton—Arnott Demonstration—The replication of species.
Wed.	19		Second L.D.S. Examination begins.
Thurs.	20	5.00	Professor D. P. Choyce—Hunterian Lecture—The development and uses of all-acrylic anterior chamber implants in ophthalmic surgery.
Fri.	21		Anaesthetic Course ends.
Sat.	22		Last day for applications for Lectureships. Surgical Lectures and Clinical Conferences end.
Mon.	24		Dental Lectures and Clinical Conferences begin.
		5.00	Professor W. F. W. Southwood—Hunterian Lecture—Villous tumours of the large intestine.
Tues.	25		Last day for nomination of candidates for the Council. Final Fellowship Examination (Ophthalmology and Otolaryngology) begins.
		5.00	Mr. Terence Ward, C.B.E.—Fractures of the mandible.
		6.00	Sir Harry Platt, Bt.—Ruscoe Clarke Memorial Lecture—
		6.15	Mr. N. L. Rowe—The treatment of unerupted and impacted teeth.
Wed.	26	5.00	Professor D. Slome—Arnott Demonstration—
Thurs.	27	5.00	Professor Wilder Penfield, O.M., C.M.G.—Lister Memorial Lecture—The brain's record of experience.
		5.00	Professor G. L. Howe—The complications of extraction—I.
		6.15	Professor G. L. Howe—The complications of extraction—II.

Plaster of Paris bandage in a NEW FORM for made-to-measure plaster slabs

The wastage of time and material caused by making up Plaster of Paris bandage slabs from rolls or pre-cut lengths has now been eliminated.

Gypsona is now supplied in a continuous zig-zag length of 6 thicknesses in a dispenser pack, so that it can be cut quickly and exactly to any desired length of slab.

- **ELIMINATES WASTE**
- **SAVES TIME** in unpacking, measuring, cutting and making up
- **SAVES SPACE** in storage and handling
- **REDUCES COSTS**



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The Nutritional Properties of Bovril

Bovril is far more than a pleasantly-flavoured drink. Its unique mixture of meat extract, hydrolysed beef, whole lean beef, beef stock and yeast extract makes it a highly nutritious food from the point of view of vitamins and protein.

1. Vitamins of the B-complex. One cup of Bovril supplies 20% of the daily requirement of the normal adult for vitamin B_2 (riboflavin) and 20% of the nicotinic acid (vitamin PP).

2. Haematinic Factors. Of all the factors required for blood formation, only three are likely to be limited in the diet – iron, vitamin B_{12} and folic acid. One cup of Bovril will supply 35% of the adult's daily requirement of vitamin B_{12} (cyanocobalamin) and 20% of the folic acid.

3. Gastric Secretion. The unique mixture that is Bovril is the most powerful known stimulant of gastric secretion – even more powerful than meat extract itself. It is, therefore, particularly useful for elderly patients and convalescents.

4. Appetite. A major factor in the rapid recovery from serious illness or major surgery is a good intake of protein foods. Poor appetite can delay recovery. Bovril is a great help in promoting good appetite while stimulating gastric secretion.

Every ounce of Bovril contains: 1.02 mg riboflavin, 6.8 mg niacin, 1.1 µg vitamin B_{12}, 60 µg folic acid.

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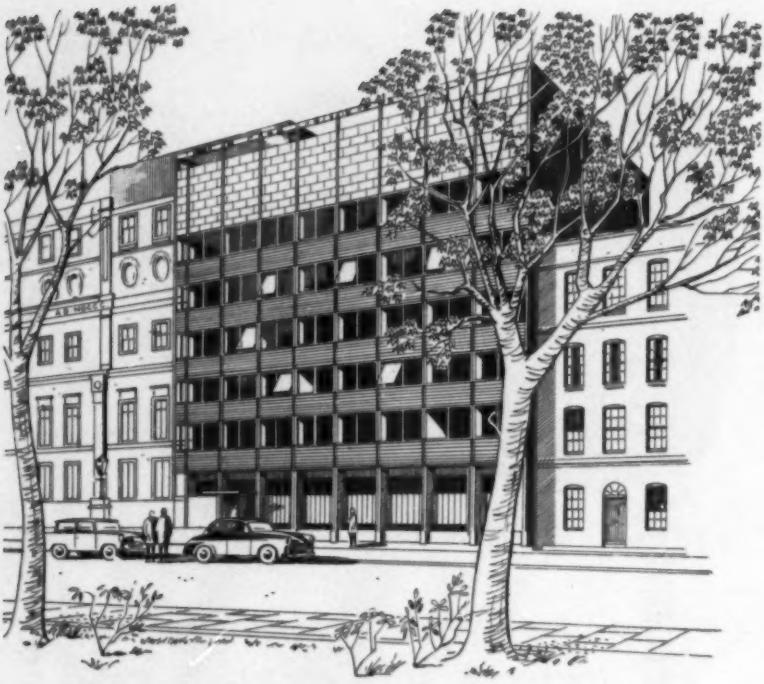

Help build this great Cancer Research Centre

The fight against cancer—mankind's cruellest enemy—is being intensified. The Imperial Cancer Research Fund seeks your help in building new laboratories in Lincoln's Inn Fields. Due to open next year, this will be the most advanced research centre in Europe. But £1,000,000 is needed to complete it.

The Imperial Cancer Research Fund, pioneer organisation of its kind, was founded by the Royal Colleges of Physicians and Surgeons to undertake this vital work in its own Laboratories.

To widen its activities and to speed results, the Fund—which receives no official grant—makes this *personal* appeal to you. Will you please help—*now*?

IMPERIAL CANCER RESEARCH FUND

PATRON: HER MAJESTY THE QUEEN

Please send your gift to **A. Dickson-Wright Esq., M.S., F.R.C.S., C.R.F. 94, Imperial Cancer Research Fund, 49 Lincoln's Inn Fields, London, W.C.2**

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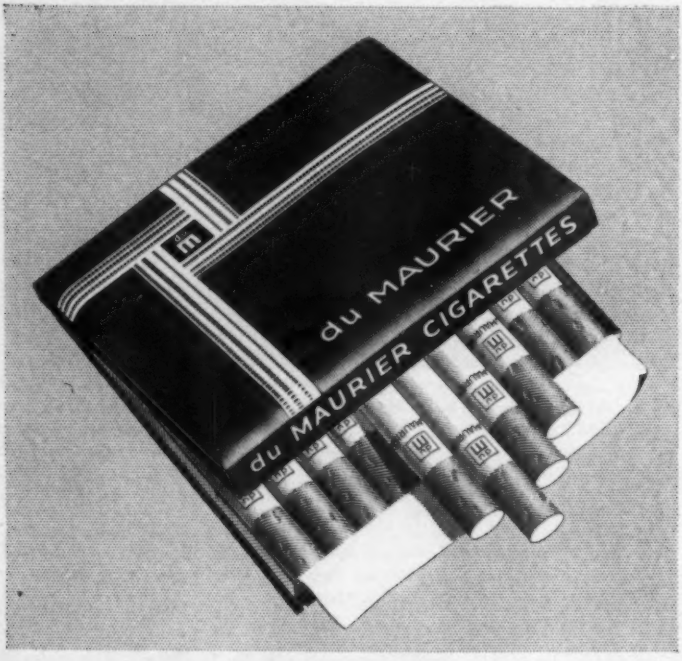

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